United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Michigan Department of Agriculture, Michigan Agricultural Experiment Station, Michigan State University Extension, Michigan Technological University, and Roscommon County Board of Commissioners

Soil Survey of Roscommon County, Michigan

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How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

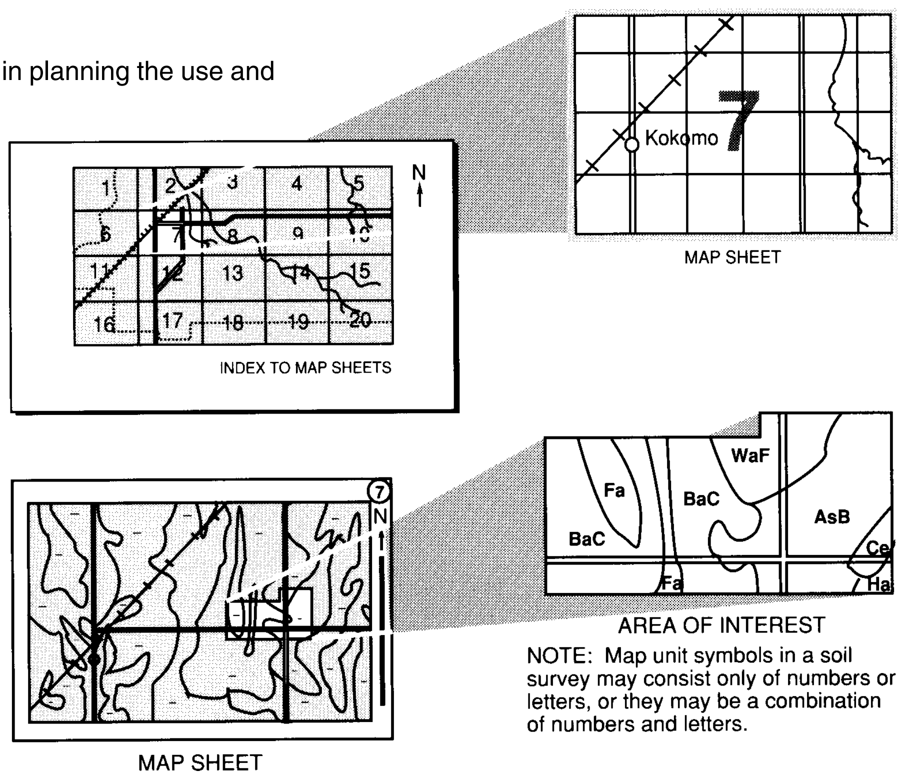
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1998. Soil names and descriptions were approved in 1999. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1999. This survey was made cooperatively by the Natural Resources Conservation Service, the Michigan Department of Agriculture, the Michigan Agricultural Experiment Station, Michigan State University Extension, and Michigan Technological University. The survey is part of the technical assistance furnished to the Crawford-Roscommon County Soil Conservation District. The Roscommon County Board of Commissioners provided financial assistance for the survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: The community of Houghton Lake on the south side of Houghton Lake looking north. Houghton Lake is a popular destination for year-round recreation.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service homepage on the World Wide Web. The address is http://www.nrcs.usda.gov.

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Issued October 2005

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Ronald C. Williams
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Roscommon County, Michigan

By Stephen W. Tardy

Fieldwork by Stephen W. Tardy, Jon M. Quisler, Jamie Antoniewicz, Larry K. Brummund, Jonathon D. Reedstrom, Martin L. Kroell III, Rick W. Neilson, John O. Werlein, Thomas H. Purkey, and Erik P. Johnson

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with Michigan Department of Agriculture, Michigan Agricultural Experiment Station, Michigan State University Extension, Michigan Technological University, and Roscommon County Board of Commissioners

Roscommon County is in the north-central part of Michigan's Lower Peninsula (fig. 1). It is bordered by Crawford County on the north, Ogemaw County on the east, Clare and Gladwin Counties on the south, and Missaukee County on the west. It has an area of 579 square miles, or 371,251 acres. Roscommon is the county seat. The population concentration is in northern Denton and Roscommon Townships and along the shore of Houghton Lake and Higgins Lake. In 1990, the population of Roscommon County was 19,776.

The major income in the county is derived from employment in education, government services, recreation, tourism, and retail trade.

Soil scientists have determined that there are about 40 kinds of soils in Roscommon County. The soils vary widely in texture and natural drainage, slope, and other characteristics.

The undulating to hilly soils in Roscommon County are dominantly well drained. The level and nearly level soils are dominantly somewhat poorly drained to very poorly drained.

Erosion generally is a severe hazard in unprotected areas, and measures are needed to control erosion and reduce sedimentation in lakes and streams. If well managed, the soils are suited to forestland and to recreational uses. The well drained soils, which make up about one-third of the county, are suited to recreational and urban development.

This soil survey updates the survey of Roscommon County published in 1924 (Veatch and others, 1924). It provides additional information and has larger maps, which show the soils in greater detail.

General Nature of the County

This section provides general information concerning Roscommon County. It describes climate, history and development, physiography, lakes and streams, and agriculture.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Houghton Lake, Michigan, in the period from 1964 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 19.5 degrees F and the average daily minimum temperature is 11.1 degrees. The lowest temperature on record, which occurred on February 1, 1918, is -48 degrees. In summer, the average temperature is 65.1 degrees and the average daily maximum temperature is 76.9 degrees. The highest recorded temperature, which occurred on June 1, 1934, and July 8 and 13, 1937, is 107 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base

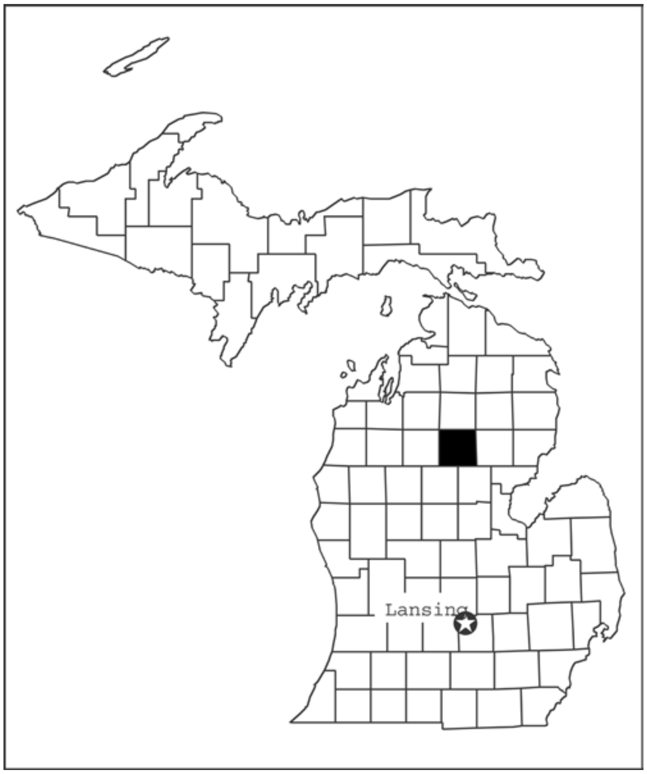

Figure 1.—Location of Roscommon County in Michigan.

temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 28.71 inches. Of this total, 14.9 inches, or about 52 percent, usually falls in May through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 3.83 inches on July 10, 1984. Thunderstorms occur on about 31 days each year, and most occur in June, July, and August.

The average seasonal snowfall is 76 inches. The greatest snow depth at any one time during the period of record was 24 inches on January 25, 1979. On the average, 108 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year. The heaviest 1-day snowfall on record was 15.4 inches recorded on January 26, 1978.

The average relative humidity in midafternoon is about 63 percent. Humidity is higher at night, and the average at dawn is about 84 percent. The sun shines 62 percent of the time possible in summer and 30 percent in winter. The prevailing wind is from the south in the summer and from the west and northwest in the winter and spring. Average windspeed is highest, 10.1 miles per hour, in January.

History and Development

Roscommon County has a history dating back well before the arrival of European settlers. Native American evidence in the county includes three villages, burial grounds, and several mounds. The Native Americans who occupied the area were mainly the Chippewa and Ojibway tribes. Most settlements and structures were located near Houghton Lake and the Muskegon and Cut Rivers. Among the Native American trails in the county was the main north-south Grand Traverse-Saginaw trail, which runs through the middle of the county. Many Native Americans referred to the area as Mikenauk, after a Chippewa chief.

Two years after the area passed from Native American control in 1836 by the Washington Treaty, the name of the county was changed. Surveyor John Brink named it Roscommon after a county in Ireland. A resurvey in 1852 by William Burt changed the name of Red Lake to Houghton Lake and the name of Forginson Lake to Higgins Lake. These new names were in honor of fellow surveyors and geologists Douglas Houghton and Silvester Higgins. In 1875, the area now known as Roscommon County was legally established. The settlement of Houghton Lake, which was started in 1873, was chosen as a temporary county seat. In 1879, the county seat was changed to the present-day village of Roscommon. In the years immediately following the Civil War, Roscommon County's lakes, rivers, and streams served as highways for the transportation of lumber out of the county to sawmills on the Au Sable, Muskegon, and Tittabawassee Rivers. By 1878, narrow-gauge railroads served the lumbering industry and settlements.

As early as 1870, groups of vacationers from the Saginaw area were traveling to Higgins Lake for rest, hunting, and fishing. The use of tents and cottages became a regular occurrence around the lakes. The Higgins Lake, Lakeside, and Cottage Grove associations are early examples of vacation settlements in Roscommon County.

Most early attempts to settle the county for agriculture use in the 1880s and 1890s failed. By 1903, tax-delinquent lands had reverted back to the State and were designated as State forest. Forest fires in the 1900s prompted the Public Domain Commission to institute fire patrols and other conservation measures to save the area from neglect. From 1933 to

1941, the Civilian Conservation Corps contributed to reforestation efforts and to the parks and recreational facilities available to the public.

From 1870 to 1880, the population of the county was associated primarily with the logging industry. During this period the population grew to almost 3,000. As the last of the logging drives ended around the turn of the 20th century, the population of the county declined. In the 1920s, the population of Houghton and Higgins Lake started to grow. Roscommon County grew with the influx of visitors and vacationers enjoying the area via automobile. This growth was stimulated by the arrival of electrification in the mid 1930s and the paving of old U.S. Highway 27 in 1936. By 1990, the county's population had grown to almost 20,000. This number is double the population reported in the 1970 census.

Physiography

The topography of Roscommon County is mainly the result of the deposition and movement of materials during the Late Wisconsinan Glaciation (fig. 2). This glaciation was the last glacial epoch that affected Michigan. It lasted in this area from around 14,000 to 8,000 years before present (B.P.).

Roscommon County is in the Michigan-Saginaw interlobate area, the southeast corner of the county having been slightly affected by the Saginaw Lobe. Kame moraines in the county date from the Port Bruce age, which approximates the advance of the Saginaw Lobe. The largest of these kame moraines extends from southeastern Richfield Township (the Indian Springs kamic area) to southeastern Roscommon Township. Other morainic features are scattered throughout the county. Several of the more prominent ones are south of Houghton Lake and north, south, and southeast of Higgins Lake.

Other landform features are end moraines, ground moraines, collapsed lake plains, and the Saint Helen outwash plain, which makes up most of the county and accounts for its sandy, nearly level appearance. Ponded areas and bogs are also common throughout. Soils (unconsolidated) lying over the bedrock formations range in thickness from 400 to 700 feet. These materials for the most part were glacially deposited.

The highest elevation in the county is 1,579 feet at Indian Springs lookout tower, Richfield Township, sec. 14, R. 1 W., T. 22 N. The lowest elevation is 850 feet in Nester Township, in the southeast corner of the county, sec. 35, R. 1 W., T. 20 N.

Lakes and Streams

There are three watersheds in Roscommon County. The Au Sable and Saginaw watersheds drain eventually into Lake Huron, and the Muskegon watershed drains into Lake Michigan. The Au Sable watershed is in the northeast corner of Roscommon County, roughly north and east of Interstate 75. The Saginaw watershed is in the southeast corner of the county, from just north of west and east Twin Lakes. The Muskegon watershed encompasses the area south and west of Interstate 75, excluding the southeast corner of Roscommon County.

The three largest lakes in the county are Houghton Lake, which covers 20,044 acres and has 30 miles of shoreline; Higgins Lake (fig. 3), which covers 9,600 acres and has a maximum depth of 141 feet; and Lake Saint Helen, which covers 2,400 acres. The largest land feature is the Dead Stream Swamp, which covers 25,000 acres (of which 985 acres is flooded). About 10 percent of the land surface in the county is covered by water.

Major rivers in the county are the Au Sable, Muskegon, Cut, and Tittabawassee Rivers.

Agriculture

The history of farming in Roscommon County closely follows that of the lumbering industry. As lumbering in the county grew, so did the amount of cleared land. The farms reaped small profits from supplying the camps and mills with the necessary agricultural products, particularly hay and other feed for work animals. During the winter, farmers could work in the logging camps and add to their income. As the lumbering camps were abandoned for other areas, so were most of the farms, especially those located on the sandy soils. According to the 1925 census of agriculture, about 13 percent of the county was used as farmland. Of this total, only about 18 percent of the farmland was used for crops or pasture. The early farmers grew hay, oats, potatoes, and some wheat and corn. Each farm typically kept some livestock. Later on, the trend was toward small grain, hay, and cow-calf production. For a time in the 1920s and 1930s, specialty crops were grown to supply summer visitors. These specialty crops included apples, raspberries, dewberries, strawberries, cabbage, onions, and mint. Wild blueberries, which grow in cleared areas in the sandy uplands, were a source of considerable income.

The number and distribution of farms in the county

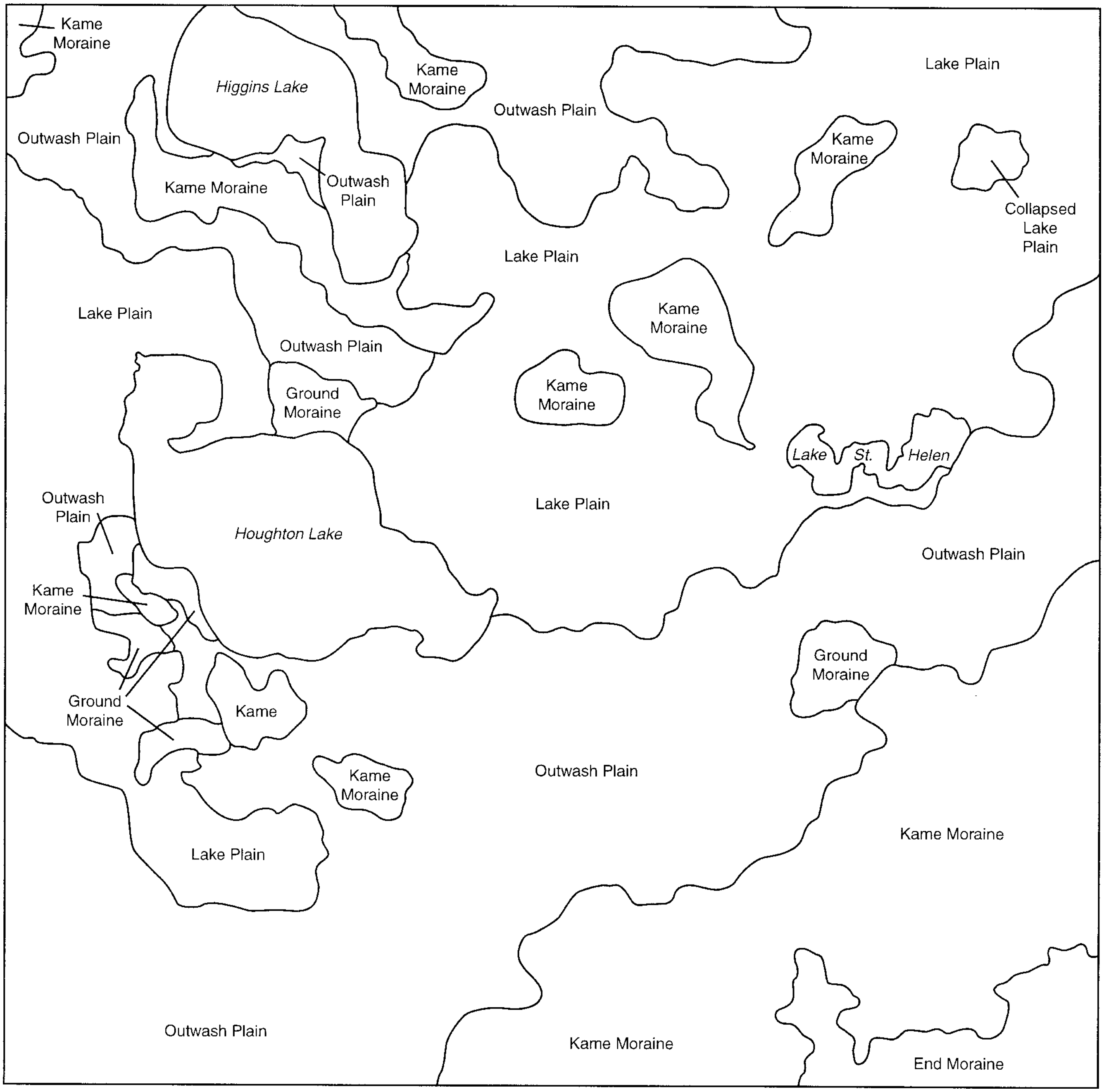

Figure 2.—Dominant glacial landforms of Roscommon County.

are closely related to the soils. There are four separate farming communities, all located in areas of the favorable clayey soils. Farmland holdings are generally 40 to 320 acres in size. The low acreage of suitable soils for farming, low soil temperatures, the short growing season, the distance to markets, and the small local markets hinder farming activities.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and

management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; and the kinds of crops and native plants growing on the soil. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however,

Figure 3.—Higgins Lake is the second largest lake in Roscommon County.

soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, soil reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on forest yields under defined levels of management are assembled from forest site index records and from plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. These broad areas are called associations. Each association on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, drainage, and other characteristics that affect management.

1. Graycalm-Grayling Association

Nearly level to steep, somewhat excessively drained and excessively drained, sandy soils on outwash plains, lake plains, and moraines

Setting

Landform: Outwash plains, lake plains, moraines
Slope range: 0 to 45 percent

Composition

Extent of the association in the survey area: 27 percent
Extent of the soils in the association:
Graycalm soils—45 percent
Grayling soils—40 percent
Soils of minor extent—15 percent

Soil Properties and Qualities

Graycalm

Drainage class: Somewhat excessively drained
Position on the landform: Flats, knolls, ridges
Parent material: Sandy sediments
Surface textural class: Sand
Slope class: Nearly level to steep

Grayling

Drainage class: Excessively drained
Position on the landform: Flats, knolls, ridges
Parent material: Sandy sediments
Surface textural class: Sand
Slope class: Nearly level to steep

Soils of Minor Extent

- The very poorly drained Tawas soils in depressions and drainageways
- The moderately well drained Croswell soils on the slightly lower flats

Use and Management

Major uses: Forestland
Management concerns: Equipment limitations, seedling mortality

2. Graycalm-Klacking-Perecheney Association

Nearly level to steep, somewhat excessively drained, well drained, and moderately well drained, sandy soils on outwash plains, lake plains, and moraines

Setting

Landform: Outwash plains, lake plains, moraines
Slope range: 0 to 45 percent

Composition

Extent of the association in the survey area: 22 percent
Extent of the soils in the association:
Graycalm soils—45 percent
Klacking soils—30 percent
Perecheney soils—15 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Graycalm

Drainage class: Somewhat excessively drained
Position on the landform: Flats, knolls, ridges
Parent material: Sandy sediments
Surface textural class: Sand
Slope class: Nearly level to steep

Klacking

Drainage class: Well drained
Position on the landform: Flats, knolls, ridges
Parent material: Sandy and loamy sediments
Surface textural class: Sand
Slope class: Nearly level to steep

Perecheney

Drainage class: Moderately well drained
Position on the landform: Flats, knolls, ridges
Parent material: Sandy and loamy sediments
Surface textural class: Sand
Slope class: Nearly level to gently rolling

Soils of Minor Extent

- The excessively drained Rubicon and Grayling soils in positions similar to those of the Graycalm and Klacking soils
- The very poorly drained Tawas soils in depressions and drainageways

Use and Management

Major uses: Forestland
Management concerns: Equipment limitations, seedling mortality

3. Kellogg-Allendale Association

Nearly level to gently rolling, moderately well drained and somewhat poorly drained, sandy soils on lake plains, outwash plains, and moraines

Setting

Landform: Lake plains, outwash plains, moraines
Slope range: 0 to 6 percent

Composition

Extent of the association in the survey area: 1 percent
Extent of the soils in the association:
Kellogg soils—85 percent
Allendale soils—10 percent
Soils of minor extent—5 percent

Soil Properties and Qualities

Kellogg, sandy substratum

Drainage class: Moderately well drained
Position on the landform: Flats, knolls
Parent material: Sandy over clayey sediments
Surface textural class: Sand
Slope class: Nearly level and gently undulating

Allendale

Drainage class: Somewhat poorly drained
Position on the landform: Low flats, swales
Parent material: Sandy over clayey sediments
Surface textural class: Sand
Slope class: Nearly level and gently undulating

Soils of Minor Extent

- The moderately well drained Geels soils in positions similar to those of the Kellogg soils
- The very poorly drained Wakeley soils in depressions and drainageways

Use and Management

Major uses: Forestland
Management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

4. Tawas-Lupton-Leafriver Association

Nearly level, very poorly drained, mucky soils on lake plains, outwash plains, and moraines

Setting

Landform: Lake plains, outwash plains, moraines
Slope range: 0 to 2 percent

Composition

Extent of the association in the survey area: 7 percent
Extent of the soils in the association:
Tawas soils—35 percent
Lupton soils—35 percent
Leafriver soils—20 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Tawas

Drainage class: Very poorly drained
Position on the landform: Low flats, depressions, drainageways

Parent material: Organic material over sandy sediments
Surface textural class: Muck
Slope class: Nearly level

Lupton

Drainage class: Very poorly drained
Position on the landform: Low flats, depressions, drainageways
Parent material: Organic material
Surface textural class: Muck
Slope class: Nearly level

Leafriver

Drainage class: Very poorly drained
Position on the landform: Low flats, depressions, drainageways
Parent material: Organic material over sandy sediments
Surface textural class: Muck
Slope class: Nearly level

Soils of Minor Extent

- The very poorly drained Deford and Kinross soils in positions similar to those of the Tawas, Lupton, and Leafriver soils
- The somewhat poorly drained Au Gres soils on low knolls
- The excessively drained Rubicon soils on knolls

Use and Management

Major uses: Forestland
Management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

5. Croswell-Au Gres-Tawas Association

Nearly level to undulating, moderately well drained, somewhat poorly drained, and very poorly drained, sandy and mucky soils on lake plains, outwash plains, and ground moraines

Setting

Landform: Lake plains, outwash plains, moraines
Slope range: 0 to 6 percent

Composition

Extent of the association in the survey area: 36 percent
Extent of the soils in the association:
Croswell soils—35 percent
Au Gres soils—35 percent
Tawas soils—15 percent
Soils of minor extent—15 percent

Soil Properties and Qualities

Croswell

Drainage class: Moderately well drained
Position on the landform: Flats, knolls
Parent material: Sandy sediments
Surface textural class: Sand
Slope class: Nearly level to undulating

Au Gres

Drainage class: Somewhat poorly drained
Position on the landform: Low flats, low knolls, swales
Parent material: Sandy sediments
Surface textural class: Sand
Slope class: Nearly level to undulating

Tawas

Drainage class: Very poorly drained
Position on the landform: Swales, depressions, drainageways
Parent material: Organic material over sandy sediments
Surface textural class: Muck
Slope class: Nearly level

Soils of Minor Extent

- The excessively drained Rubicon and Grayling soils on knolls
- The very poorly drained Leafriver and Lupton soils in positions similar to those of the Tawas soils

Use and Management

Major uses: Forestland
Management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

6. Wakeley-Au Gres-Deford Association

Nearly level, very poorly drained and somewhat poorly drained, mucky and sandy soils on lake plains and outwash plains

Setting

Landform: Lake plains, outwash plains
Slope range: 0 to 3 percent

Composition

Extent of the association in the survey area: 1 percent
Extent of the soils in the association:
Wakeley soils—60 percent

Au Gres soils—15 percent
Deford soils—15 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Wakeley

Drainage class: Very poorly drained
Position on the landform: Low flats, depressions
Parent material: Sandy over clayey sediments
Surface textural class: Muck
Slope class: Nearly level

Au Gres

Drainage class: Somewhat poorly drained
Position on the landform: Low knolls
Parent material: Sandy sediments
Surface textural class: Sand
Slope class: Nearly level

Deford

Drainage class: Very poorly drained
Position on the landform: Low flats, depressions
Parent material: Sandy sediments
Surface textural class: Muck
Slope class: Nearly level

Soils of Minor Extent

- The very poorly drained Leafriver and Tawas soils in depressions and drainageways
- The very poorly drained Kinross soils in positions similar to those of the Wakeley and Deford soils

Use and Management

Major uses: Forestland
Management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

7. Debolt-Pinewood Association

Nearly level, moderately well drained and somewhat poorly drained, loamy soils on collapsed lake plains

Setting

Landform: Collapsed lake plains
Slope range: 0 to 3 percent

Composition

Extent of the association in the survey area: Less than 1 percent
Extent of the soils in the association:
Debolt soils—50 percent
Pinewood soils—40 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Debolt

Drainage class: Moderately well drained
Position on the landform: Flats
Parent material: Loamy over sandy sediments
Surface textural class: Sandy loam
Slope class: Nearly level

Pinewood

Drainage class: Somewhat poorly drained
Position on the landform: Flats, swales
Parent material: Loamy over sandy sediments
Surface textural class: Sandy loam
Slope class: Nearly level

Soils of Minor Extent

- The moderately well drained Perecheney and Geels soils in positions similar to those of the Debolt soils
- The very poorly drained Sims and Tawas soils in depressions and drainageways

Use and Management

Major uses: Pasture, woodland
Management concerns: Wetness, soil compaction, equipment limitations, plant competition

8. Nester-Morganlake-Rubicon Association

Nearly level to steep, moderately well drained and excessively drained, sandy and loamy soils on moraines, outwash plains, lake plains, and beach ridges

Setting

Landform: Moraines, outwash plains, lake plains, beach ridges
Slope range: 0 to 35 percent

Composition

Extent of the association in the survey area: 2 percent
Extent of the soils in the association:
Nester soils—50 percent
Morganlake soils—30 percent
Rubicon soils—10 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Nester

Drainage class: Moderately well drained
Position on the landform: Flats, knolls, low ridges

Parent material: Loamy sediments
Surface textural class: Sandy loam
Slope class: Nearly level to gently rolling

Morganlake

Drainage class: Moderately well drained
Position on the landform: Flats, knolls, low ridges
Parent material: Sandy over loamy sediments
Surface textural class: Sand
Slope class: Nearly level to gently rolling

Rubicon

Drainage class: Excessively drained
Position on the landform: Flats, knolls, ridges
Parent material: Sandy sediments
Surface textural class: Sand
Slope class: Nearly level to steep

Soils of Minor Extent

• The well drained Menominee and Curtisville soils on ridgetops and side slopes
• The very poorly drained Sims, Wakeley, and Tawas soils in depressions and drainageways

Use and Management

Major uses: Forestland
Management concerns: Equipment limitations, seedling mortality, plant competition

9. Kawkawlin-Sims-Nester Association

Nearly level to gently rolling, somewhat poorly drained, very poorly drained, and moderately well drained, loamy soils on ground moraines and end moraines

Setting

Landform: Ground moraines and end moraines
Slope range: 0 to 12 percent

Composition

Extent of the association in the survey area: 1 percent
Extent of the soils in the association:
Kawkawlin soils—45 percent
Sims soils—30 percent
Nester soils—18 percent
Soils of minor extent—7 percent

Soil Properties and Qualities

Kawkawlin

Drainage class: Somewhat poorly drained
Position on the landform: Flats, low knolls
Parent material: Loamy sediments
Surface textural class: Loam
Slope class: Nearly level and gently undulating

Sims

Drainage class: Very poorly drained
Position on the landform: Low flats, swales, depressions
Parent material: Loamy sediments
Surface textural class: Loam
Slope class: Nearly level

Nester

Drainage class: Moderately well drained
Position on the landform: Flats, knolls, side slopes
Parent material: Loamy sediments
Surface textural class: Sandy loam
Slope class: Nearly level to gently rolling

Soils of Minor Extent

• The somewhat poorly drained Bowers soils in positions similar to those of the Kawkawlin soils
• The poorly drained Deerheart soils in positions similar to those of the Sims soils
• The moderately well drained Morganlake soils in positions similar to those of the Nester soils

Use and Management

Major uses: Forestland, pasture
Management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition, soil compaction, wetness

10. Wakeley-Allendale Association

Nearly level, very poorly drained and somewhat poorly drained, mucky and sandy soils on outwash plains, lake plains, and moraines

Setting

Landform: Outwash plains, lake plains, moraines
Slope range: 0 to 3 percent

Composition

Extent of the association in the survey area: 2 percent
Extent of the soils in the association:
Wakeley soils—55 percent
Allendale soils—40 percent
Soils of minor extent—5 percent

Soil Properties and Qualities

Wakeley

Drainage class: Very poorly drained
Position on the landform: Low flats, swales, depressions
Parent material: Sandy over clayey sediments
Surface textural class: Muck
Slope class: Nearly level

Allendale

Drainage class: Somewhat poorly drained
Position on the landform: Low flats, swales
Parent material: Sandy over clayey sediments
Surface textural class: Sand
Slope class: Nearly level

Soils of Minor Extent

- The moderately well drained Kellogg and Morganlake soils on knolls
- The very poorly drained Tawas and Leafriver soils in depressions and drainageways

Use and Management

Major uses: Forestland
Management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Graycalm sand, 0 to 6 percent slopes, is a phase of the Graycalm series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Graycalm-Grayling sands, 0 to 6 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use

and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Histosols and Aquents, ponded, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Pits, borrow, is an example.

Listed at the end of each map unit description are several interpretive groups. The land capability classification and woodland ordination systems are explained under the heading "Use and Management of the Soils." Michigan soil management groups are assigned based on the dominant soil texture and natural drainage class and on management concerns (Mokma, 1978). More information about Michigan soil management groups is available in the local office of the Natural Resources Conservation Service.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

13—Tawas-Lupton mucks

Setting

Landform: Low flats, depressions, and drainageways on outwash plains, lake plains, and moraines
Shape of areas: Irregular and linear
Size of areas: 3 to 3,000 acres

Typical Profile

Tawas

Surface layer:
0 to 4 inches—very dark brown muck

Subsoil:
4 to 24 inches—black and very dark brown muck

Substratum:
24 to 80 inches—brown sand

Lupton

Surface layer:
0 to 15 inches—black muck

Substratum:
15 to 80 inches—black muck

Soil Properties and Qualities

Permeability: Tawas—moderately slow to moderately rapid in the organic material and rapid in the underlying sand; Lupton—moderately slow to moderately rapid
Available water capacity: Very high
Drainage class: Very poorly drained
Seasonal high water table: 1 foot above to 1 foot below the surface from November through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Tawas and similar soils: 35 to 70 percent
Lupton and similar soils: 30 to 50 percent
Contrasting inclusions: 0 to 15 percent

Inclusions

Contrasting inclusions:
- The somewhat poorly drained Au Gres soils in the slightly higher landform positions
- The very poorly drained Leafriver and Deford soils in landform positions similar to those of the Tawas and Lupton soils
- Small areas of open water

Similar inclusions:
- Soils that have a loamy substratum
- Soils that are more acid in the profile

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition, wetness
Management considerations:
- Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
- Log landings should be located in areas of the drier, more suitable soils.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on these soils.
- Carefully managed reforestation helps to control undesirable understory plants.
- Selective cutting or strip cutting and leaving desirable seed trees along the edge of the openings can promote natural regeneration.

Building site development

Major management concerns: Ponding
Management considerations:
• Because of ponding and low strength, these soils are generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Ponding
Management considerations:
• Because of ponding and low strength, these soils are generally unsuited to use as sites for septic tank absorption fields.

Interpretive Groups

Land capability classification: Tawas—6w; Lupton—6w
Woodland ordination symbol: Tawas—5W; Lupton—2W
Michigan soil management group: Tawas—M/4c; Lupton—Mc

14—Dawson-Loxley peats

Setting

Landform: Low flats, depressions, and drainageways on outwash plains, lake plains, and moraines
Shape of areas: Irregular and linear
Size of areas: 3 to 500 acres

Typical Profile

Dawson

Surface layer:
0 to 5 inches—light yellowish brown peat

Subsoil:
5 to 19 inches—black muck

Substratum:
19 to 80 inches—dark gray, dark brown, dark yellowish brown, and yellowish brown sand

Loxley

Surface layer:
0 to 6 inches—dark brown peat

Subsoil:
6 to 21 inches—very dark brown and black muck

Substratum:
21 to 80 inches—black muck

Soil Properties and Qualities

Permeability: Dawson—moderately slow in the organic part and rapid in the sandy part; Loxley—moderately slow to moderately rapid
Available water capacity: Very high
Drainage class: Very poorly drained
Seasonal high water table: 1 foot above to 1 foot below the surface from November through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: moderate

Composition

Dawson and similar soils: 40 to 65 percent
Loxley and similar soils: 35 to 45 percent
Contrasting inclusions: 0 to 15 percent

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Au Gres soils in the slightly higher landform positions
• The very poorly drained Leafriver, Kinross, and Deford soils in landform positions similar to those of the Dawson and Loxley soils

Similar inclusions:
• Soils that have a loamy substratum
• Soils that are more alkaline throughout

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition, seasonal wetness
Management considerations:
• Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
• Because of wetness, seedling mortality, and plant competition, trees are generally not planted on these soils.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.

Building site development

Major management concerns: Ponding
Management considerations:
• Because of ponding and low strength, these soils are generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Ponding
Management considerations:
• Because of ponding and low strength, these soils are

generally unsuited to use as sites for septic tank absorption fields.

Interpretive Groups

Land capability classification: Dawson—7w; Loxley—7w
Woodland ordination symbol: 2W
Michigan soil management group: Dawson—M/4c-a; Loxley—Mc-a

15A—Croswell-Au Gres sands, 0 to 3 percent slopes

Setting

Landform: Low flats and swales on outwash plains and lake plains
Shape of areas: Irregular and linear
Size of areas: 3 to 200 acres

Typical Profile

Croswell

Organic mat:
0 to 1 inch—very dusky red, partially decomposed forest litter

Surface layer:
1 to 2 inches—black sand

Subsurface layer:
2 to 6 inches—pinkish gray sand

Subsoil:
6 to 17 inches—dark brown and brown sand
17 to 42 inches—yellowish brown and brownish yellow sand

Substratum:
42 to 80 inches—light yellowish brown and pale brown, mottled sand

Au Gres

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 5 inches—black and grayish brown sand

Subsoil:
5 to 14 inches—dark brown and strong brown sand
14 to 33 inches—yellowish brown and brownish yellow, mottled sand

Substratum:
33 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Croswell—moderately well drained; Au Gres—somewhat poorly drained
Seasonal high water table: Croswell—at a depth of 2.0 to 3.5 feet at some time from October through May; Au Gres—at a depth of 0.5 foot to 1.5 feet at some time from October through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Croswell and similar soils: 35 to 70 percent
Au Gres and similar soils: 30 to 50 percent
Contrasting inclusions: 0 to 15 percent

Inclusions

Contrasting inclusions:
• The very poorly drained Deford and Kinross soils in depressions
• The excessively drained Grayling soils in the higher landform positions
Similar inclusions:
• Soils that do not have a dark reddish brown or dark brown subsoil
• Soils that have thin bands of loamy sand in the substratum

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Croswell—equipment limitations, seedling mortality, windthrow hazard, plant competition, seasonal droughtiness; Au Gres—equipment limitations, seedling mortality, windthrow hazard, plant competition, wetness
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting when the soil is moist can reduce the seedling mortality rate in areas of the Croswell soil.
• Trees that can withstand seasonal wetness should be selected for planting in areas of the Au Gres soil.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced

and by such harvest methods as selective cutting and strip cutting.
• Carefully managed reforestation helps to control undesirable understory plants.
• Special harvest methods may be needed to control undesirable plants.

Building site development

Major management concerns: Cutbanks caving, wetness
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields

Major management concerns: Rapid permeability, wetness
Management considerations:
• The poor filtering capacity of these soils can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• Filling or mounding with suitable material helps to raise the absorption field above the water table.

Interpretive Groups

Land capability classification: Croswell—4s; Au Gres—4w
Woodland ordination symbol: Croswell—5S; Au Gres—6W
Michigan soil management group: Croswell—5a; Au Gres—5b

16B—Graycalm sand, 0 to 6 percent slopes

Setting

Landform: Flats and knolls on outwash plains and moraines
Shape of areas: Irregular
Size of areas: 3 to 1,000 acres

Typical Profile

Surface layer:
0 to 2 inches—black sand

Subsoil:
2 to 27 inches—dark yellowish brown and yellowish brown sand
27 to 80 inches—brownish yellow sand that has bands of strong brown and brown loamy sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Somewhat excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Graycalm and similar soils: 85 to 90 percent
Contrasting inclusions: 10 to 15 percent

Inclusions

Contrasting inclusions:
• The excessively drained Grayling, well drained Klacking, and moderately well drained Perecheney soils in landform positions similar to those of the Graycalm soil

Similar inclusions:
• Soils that do not have bands of loamy sand in the substratum

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Cutbanks caving
Management considerations:
• Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Poor filtering capacity
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

Interpretive Groups

Land capability classification: 4s
Woodland ordination symbol: 6S
Michigan soil management group: 5a

17A—Croswell sand, 0 to 3 percent slopes

Setting

Landform: Low flats and knolls on outwash plains and lake plains
Shape of areas: Irregular and linear
Size of areas: 3 to 300 acres

Typical Profile

Croswell

Organic mat:
0 to 1 inch—very dusky red, partially decomposed forest litter

Surface layer:
1 to 2 inches—black sand

Subsurface layer:
2 to 6 inches—pinkish gray sand

Subsoil:
6 to 17 inches—dark brown and brown sand
17 to 42 inches—yellowish brown and brownish yellow sand

Substratum:
42 to 80 inches—light yellowish brown and pale brown, mottled sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.0 to 3.5 feet at some time from October through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Croswell and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Au Gres and Finch soils
• The excessively drained Grayling soils in the higher landform positions
• The very poorly drained Deford and Kinross soils in the lower landform positions

Similar inclusions:
• Soils that have thin bands of loamy sand in the substratum
• Soils that do not have a dark reddish brown or dark brown subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting when the soil is moist can reduce the seedling mortality rate.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Species preference can be managed by selective cutting.
• Competing vegetation generally can be controlled by mechanical means.
• Carefully managed reforestation helps to control undesirable understory plants.

Building site development

Major management concerns: Cutbanks caving, wetness
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Buildings can be constructed on well compacted fill

material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields

Major management concerns: Poor filtering capacity, wetness
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water.
• Filling or mounding with suitable material helps to raise the absorption field above the water table.

Interpretive Groups

Land capability classification: 4s
Woodland ordination symbol: 5S
Michigan soil management group: 5a

18A—Au Gres sand, 0 to 3 percent slopes

Setting

Landform: Flats and swales on outwash plains and lake plains
Shape of areas: Irregular and linear
Size of areas: 5 to 300 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 5 inches—black and grayish brown sand

Subsoil:
5 to 14 inches—dark brown and strong brown sand
14 to 33 inches—yellowish brown and brownish yellow, mottled sand

Substratum:
33 to 80 inches—light yellowish, mottled brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Somewhat poorly drained
Seasonal high water table: At a depth of 0.5 foot to 1.5 feet from October through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Au Gres and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The excessively drained Grayling and Rubicon soils in the higher landform positions
• The somewhat excessively drained Otisco soils in landform positions similar to those of the Au Gres soil
• The very poorly drained Kinross and Deford soils in the lower landform positions

Similar inclusions:
• Soils that have a cemented subsoil
• Soils that have thin bands of loamy sand in the substratum
• Soils that have a seasonal high water table at a depth of 2.0 to 3.5 feet

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
• The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• Special harvest methods may be needed to control undesirable plants.
• If trees are planted, site preparation is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Cutbanks caving, wetness, frost action
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Buildings can be constructed on well compacted fill

material, which raises the site a sufficient distance above the water table.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by frost action.

Septic tank absorption fields

Major management concerns: Wetness, rapid permeability
Management considerations:
• Mounding or adding suitable fill material helps to raise the absorption field above the water table.
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

Interpretive Groups

Land capability classification: 4w
Woodland ordination symbol: 6W
Michigan soil management group: 5b

20B—Graycalm-Grayling sands, 0 to 6 percent slopes

Setting

Landform: Flats and knolls on outwash plains, lake plains, and moraines
Shape of areas: Irregular
Size of areas: 10 to 700 acres

Typical Profile

Graycalm

Surface layer:
0 to 2 inches—black sand

Subsoil:
2 to 27 inches—dark yellowish brown and yellowish brown sand
27 to 80 inches—brownish yellow sand that has bands of strong brown and brown loamy sand

Grayling

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 3 inches—very dark brown sand

Subsurface layer:
3 to 4 inches—brown sand

Subsoil:
4 to 30 inches—dark yellowish brown, yellowish brown, and brownish yellow sand

Substratum:
30 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Graycalm—somewhat excessively drained; Grayling—excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Graycalm and similar soils: 40 to 55 percent
Grayling and similar soils: 35 to 45 percent
Contrasting inclusions: 10 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Klacking and moderately well drained Perecheney soils landform positions similar to those of the Graycalm and Grayling soils

Similar inclusions:
• Soils that have gravel in the subsoil
• Soils that have a dark reddish brown or dark brown subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Rapid permeability
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

Interpretive Groups

Land capability classification: Graycalm—4s; Grayling—6s
Woodland ordination symbol: Graycalm—6S; Grayling—4S
Michigan soil management group: Graycalm—5a; Grayling—5.7c

20D—Graycalm-Grayling sands, 6 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on moraines and outwash plains
Shape of areas: Irregular and linear
Size of areas: 10 to 700 acres

Typical Profile

Graycalm

Surface layer:
0 to 2 inches—black sand

Subsoil:
2 to 27 inches—dark yellowish brown and yellowish brown sand
27 to 80 inches—brownish yellow sand that has bands of strong brown and brown loamy sand

Grayling

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 3 inches—very dark brown sand

Subsurface layer:
3 to 4 inches—brown sand

Subsoil:
4 to 30 inches—dark yellowish brown, yellowish brown, and brownish yellow sand

Substratum:
30 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Graycalm—somewhat excessively drained; Grayling—excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight or moderate
Hazard of wind erosion: Severe

Composition

Graycalm and similar soils: 40 to 70 percent
Grayling and similar soils: 25 to 45 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Klacking soils in landform positions similar to those of the Graycalm and Grayling soils
• The moderately well drained Perecheney soils in the lower landform positions

Similar inclusions:
• Soils that have gravel in the subsoil
• Soils that have a dark reddish brown or dark brown subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving, slope
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Rapid permeability, slope
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: Graycalm—6s; Grayling—7s
Woodland ordination symbol: Graycalm—6S; Grayling—7S
Michigan soil management group: Graycalm—5a; Grayling—5.7a

20F—Graycalm-Grayling sands, 18 to 45 percent slopes

Setting

Landform: Escarpments, side slopes, and ridgetops on moraines and outwash plains
Shape of areas: Irregular and linear
Size of areas: 5 to 200 acres

Typical Profile

Graycalm

Surface layer:
0 to 2 inches—black sand

Subsoil:
2 to 27 inches—dark yellowish brown and yellowish brown sand
27 to 80 inches—brownish yellow sand that has bands of strong brown and brown loamy sand

Grayling

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 3 inches—very dark brown sand

Subsurface layer:
3 to 4 inches—brown sand

Subsoil:
4 to 30 inches—dark yellowish brown, yellowish brown, and brownish yellow sand

Substratum:
30 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Graycalm—somewhat excessively drained; Grayling—excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Low
Flooding: None
Hazard of water erosion: Moderate or severe
Hazard of wind erosion: Severe

Composition

Graycalm and similar soils: 45 to 70 percent
Grayling and similar soils: 25 to 40 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Klacking soils in landform positions similar to those of the Graycalm and Grayling soils

Similar inclusions:
• Soils that have gravel in the subsoil
• Soils that have a dark reddish brown or dark brown subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
• Because of the erosion hazard, water should be removed from logging roads by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
• Because of the slope, special care is needed in laying out logging roads and landings and in operating

logging equipment. Logging roads should be designed so that they conform to the topography.
• Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
• Small areas of nearly level included soils, if any are available, and suitable nearly level adjacent areas should be selected as sites for landings.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Planting when the soil is moist can reduce the seedling mortality rate.

Building site development

Major management concerns: Slope, cutbanks caving
Management considerations:
• Because of the slope, these soils are generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Slope, rapid permeability
Management considerations:
• Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

Interpretive Groups

Land capability classification: Graycalm—7s; Grayling—7s
Woodland ordination symbol: Graycalm—6R; Grayling—4R
Michigan soil management group: Graycalm—5a; Grayling—5.7a

23—Ausable-Bowstring mucks, frequently flooded

Setting

Landform: Low flats and depressions along perennial rivers and creeks on flood plains
Shape of areas: Irregular or linear
Size of areas: 5 to 150 acres

Typical Profile

Ausable

Surface layer:
0 to 9 inches—black muck

Substratum:
9 to 14 inches—brown sand that has thin bands of very dark brown muck
14 to 44 inches—dark grayish brown sand that has thin bands of very dark brown muck
44 to 80 inches—pale brown sand

Bowstring

Surface layer:
0 to 19 inches—black muck that has thin layers of gray sand

Substratum:
19 to 34 inches—dark reddish brown muck
34 to 38 inches—gray sand that has thin bands of very dark brown sand
38 to 80 inches—very dark brown muck that has thin bands of gray sand

Soil Properties and Qualities

Permeability: Ausable—moderate or moderately rapid in the organic material and rapid in the underlying sand; Bowstring—moderately slow to moderately rapid
Available water capacity: High
Drainage class: Very poorly drained
Seasonal high water table: 1 foot above to 1 foot below the surface from November through May
Surface runoff class: Negligible
Flooding: Frequent (November through May)
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Ausable and similar soils: 40 to 90 percent
Bowstring and similar soils: 10 to 50 percent
Contrasting inclusions: 0 to 10 percent

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Au Gres and moderately well drained Croswell soils in the higher landform positions

Similar inclusions:
• Soils that have 10 to 50 inches of muck overlying sand
• Soils that have an average of more than 35 percent gravel in the substratum

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:
• Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
• Landing sites generally can be used only during the driest time of the year.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• Because of wetness, severe seedling mortality, and plant competition, trees are generally not planted on these soils.

Building site development

Major management concerns: Seasonal flooding, wetness, frost action
Management considerations:
• Because of flooding, these soils are generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Seasonal flooding, wetness
Management considerations:
• Because of flooding, these soils are generally unsuited to use as sites for septic tank absorption fields.

Interpretive Groups

Land capability classification: Ausable—7w; Bowstring—6w
Woodland ordination symbol: Ausable—2W; Bowstring—3W
Michigan soil management group: Ausable—L-4c; Bowstring—L-Mc

24A—Kinross-Au Gres complex, 0 to 3 percent slopes

Setting

Landform: Low flats and shallow depressions on outwash plains, lake plains, and ground moraines
Shape of areas: Irregular and linear
Size of areas: 3 to 300 acres

Typical Profile

Kinross

Organic mat:
0 to 1 inch—black, undecomposed forest litter

Surface layer:
1 to 6 inches—black muck

Subsoil:
6 to 13 inches—grayish brown sand
13 to 28 inches—dark brown and brown, mottled sand
28 to 45 inches—dark yellowish brown sand

Substratum:
45 to 80 inches—brown sand

Au Gres

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 5 inches—black and grayish brown sand

Subsoil:
5 to 14 inches—dark brown and strong brown sand
14 to 33 inches—yellowish brown and brownish yellow, mottled sand

Substratum:
33 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Kinross—very poorly drained; Au Gres—somewhat poorly drained
Seasonal high water table: Kinross—1 foot above to 1 foot below the surface at some time from October through May; Au Gres—at a depth of 0.5 foot to 1.5 feet at some time from October through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Kinross—moderate; Au Gres—severe

Composition

Kinross and similar soils: 40 to 70 percent
Au Gres and similar soils: 30 to 50 percent
Contrasting inclusions: 0 to 10 percent

Inclusions

Contrasting inclusions:
• The poorly drained Leafriver and Deford soils in the slightly lower landform positions
• The somewhat poorly drained Otisco soils in the slightly higher landform positions

• The moderately well drained Croswell soils in the higher landform positions

Similar inclusions:
• Soils that have a surface layer of loamy sand
• Soils that have thin bands of loamy sand in the substratum
• Soils that do not have a dark reddish brown or dark brown subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
• Using heavy equipment only when the soil is relatively dry, is frozen, or has an adequate snow cover helps to prevent the formation of deep ruts.
• Year-round logging roads require roadfill and gravel. Culverts are needed in areas of the Kinross soil to maintain the natural drainage system.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
• Trees are generally not planted on the Kinross soil because of wetness, severe seedling mortality, and plant competition.

Building site development

Major management concerns: Kinross—ponding; Au Gres—wetness
Management considerations:
• Because of ponding, the Kinross soil is generally unsuited to building site development.
• In areas of the Au Gres soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields

Major management concerns: Kinross—ponding; Au Gres—wetness, rapid permeability
Management considerations:
• Because of ponding, the Kinross soil is generally unsuited to use as a site for septic tank absorption fields.
• In areas of the Au Gres soil, filling or mounding with suitable fill material helps to raise the absorption field above the water table.
• The poor filtering capacity of the Au Gres soil can result in the pollution of ground water.

Interpretive Groups

Land capability classification: Kinross—6w; Au Gres—4w
Woodland ordination symbol: Kinross—2W; Au Gres—6W
Michigan soil management group: Kinross—5c-a; Au Gres—5b

26B—Cublake sand, 0 to 6 percent slopes

Setting

Landform: Flats and knolls on outwash plains and lake plains
Shape of areas: Irregular
Size of areas: 5 to 70 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 8 inches—pinkish gray sand

Subsoil:
8 to 20 inches—brown and strong brown sand
20 to 37 inches—yellowish brown, mottled sand

Substratum:
37 to 53 inches—light yellowish brown, mottled sand
53 to 65 inches—brown and pale brown, stratified, mottled very fine sandy loam, silt loam, and loamy fine sand
65 to 80 inches—brown, stratified, mottled very fine sandy loam, loam, and silt loam

Soil Properties and Qualities

Permeability: Rapid in the sandy part and moderately slow in the loamy part
Available water capacity: Moderate
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.0 to 3.5 feet at some time from October through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Cublake and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Flink soils in landform positions similar to those of the Cublake soil
• The very poorly drained Wakeley soils in the lower landform positions
• The moderately well drained Kellogg and Croswell soils in landform positions similar to those of the Cublake soil

Similar inclusions:
• Soils that have more or less clay in the substratum
• Soils that have a surface layer of loamy sand
• Soils that do not have a dark reddish brown or dark brown subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, plant competition, windthrow hazard, seasonal droughtiness
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• Carefully managed reforestation helps to control undesirable understory plants.
• Special harvest methods may be needed to control undesirable plants.

Building site development

Major management concerns: Cutbanks caving, wetness
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields

Major management concerns: Rapid permeability, seasonal wetness, moderately slow permeability
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• Filling or mounding with suitable fill material helps to raise the absorption field above the water table.
• Backfilling the trenches with porous material helps to compensate for the restricted permeability.

Interpretive Groups

Land capability classification: 4s
Woodland ordination symbol: 7A
Michigan soil management group: 5a

34B—Kneff very fine sandy loam, 0 to 6 percent slopes

Setting

Landform: Flats and knolls on lake plains
Shape of areas: Irregular
Size of areas: 3 to 30 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown very fine sandy loam

Subsoil:
8 to 14 inches—brown silty clay loam that has coatings of brown very fine sandy loam
14 to 23 inches—dark brown silty clay loam
23 to 29 inches—dark brown, mottled silty clay loam

Substratum:
29 to 61 inches—stratified dark brown, mottled silty clay loam, silt loam, and silty clay and dark yellowish brown very fine sandy loam
61 to 80 inches—stratified, mottled pale brown sand, brown silty clay loam, and pale brown silt loam

Soil Properties and Qualities

Permeability: Moderately slow
Available water capacity: Moderate

Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.0 to 3.5 feet at some time from October through May
Surface runoff class: Medium
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Kneff and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Klacking and somewhat excessively drained Graycalm soils in landform positions similar to those of the Kneff soil
• The moderately well drained Kellogg soils in landform positions similar to those of the Kneff soil
• The somewhat poorly drained Bowers soils in the lower landform positions
Similar inclusions:
• Soils that have more clay in the subsoil
• Soils that are sand in the lower part of the substratum

Use and Management

Land use: Dominant use—forestland; other uses—building site development, idle land

Forestland

Major management concerns: Equipment limitations, plant competition
Management considerations:
• Skidders should not be used during wet periods, when ruts form easily. Year-round roads and landings require a gravel base.
• After trees are harvested, plant competition from unwanted species may delay the establishment of desired species.
• Competing vegetation can be controlled by selective cutting or similar harvest methods or by mechanical or chemical means.

Building site development

Major management concerns: Wetness
Management considerations:
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields

Major management concerns: Wetness, moderately slow permeability
Management considerations:
• Filling or mounding with suitable fill material helps to raise the absorption field above the water table.
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

Interpretive Groups

Land capability classification: 2e
Woodland ordination symbol: 3L
Michigan soil management group: 1.5a

35—Kinross muck

Setting

Landform: Low flats, swales, and depressions on outwash plains, lake plains, and ground moraines
Shape of areas: Irregular and linear
Size of areas: 3 to 100 acres

Typical Profile

Organic mat:
0 to 1 inch—black, undecomposed forest litter

Surface layer:
1 to 6 inches—black muck

Subsoil:
6 to 13 inches—grayish brown sand
13 to 28 inches—dark brown and brown, mottled sand
28 to 45 inches—dark yellowish brown sand

Substratum:
45 to 80 inches—brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Very poorly drained
Seasonal high water table: 1 foot above to 1 foot below the surface at some time from October through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Kinross and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Finch soils in landform

positions similar to or slightly higher than those of the Kinross soil
• The very poorly drained Deford soils in the slightly lower landform positions

Similar inclusions:
• Soils that have a cemented subsoil
• Soils that have a seasonal high water table between the depths of 1 and 2 feet

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
• Using heavy equipment only when the soil is relatively dry, is frozen, or has an adequate snow cover helps to prevent the formation of deep ruts.
• Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
• Log landing sites should be located in areas of the drier, more suitable soils.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
• Trees are generally not planted on this soil because of wetness, severe seedling mortality, and plant competition.

Building site development

Major management concerns: Ponding
Management considerations:
• Because of ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Ponding
Management considerations:
• Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: 6w
Woodland ordination symbol: 2W
Michigan soil management group: 5c-a

47D—Graycalm sand, 6 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on moraines and outwash plains
Shape of areas: Irregular and linear
Size of areas: 3 to 1,000 acres

Typical Profile

Surface layer:
0 to 2 inches—black sand

Subsoil:
2 to 27 inches—dark yellowish brown and yellowish brown sand
27 to 80 inches—brownish yellow sand that has thin bands of strong brown and brown loamy sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Somewhat excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight or moderate
Hazard of wind erosion: Severe

Composition

Graycalm and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Klacking soils in landform positions similar to those of the Graycalm soil
• The excessively drained Grayling and Rubicon soils in landform positions similar to those of the Graycalm soil

Similar inclusions:
• Soils that have gravel in the subsoil
• Soils that have a dark reddish brown or dark brown subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Cutbanks caving, slope
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Poor filtering capacity, slope
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: 6s
Woodland ordination symbol: 6S
Michigan soil management group: 5a

47F—Graycalm sand, 18 to 45 percent slopes

Setting

Landform: Escarpments, side slopes, and ridgetops on moraines and outwash plains
Shape of areas: Irregular
Size of areas: 3 to 100 acres

Typical Profile

Surface layer:
0 to 2 inches—black sand

Subsoil:
2 to 27 inches—dark yellowish brown and yellowish brown sand
27 to 80 inches—brownish yellow sand that has thin bands of strong brown and brown loamy sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Somewhat excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Low
Flooding: None
Hazard of water erosion: Moderate or severe
Hazard of wind erosion: Severe

Composition

Graycalm and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Klacking soils in landform positions similar to those of the Graycalm soil
• The excessively drained Grayling and Rubicon soils in landform positions similar to those of the Graycalm soil

Similar inclusions:
• Soils that have gravel in the subsoil
• Soils that have a dark reddish brown or dark brown subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
• Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
• Small areas of nearly level included soils, if any are available, and suitable nearly level adjacent areas should be selected as sites for landings.
• The risk of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

• The use of mechanical planters is limited by the slope. Hand planting of seedlings may be desirable.
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Slope
Management considerations:
• Because of the slope, this soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Slope
Management considerations:
• Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: 7s
Woodland ordination symbol: 6R
Michigan soil management group: 5a

50B—Au Gres-Kinross-Croswell complex, 0 to 6 percent slopes

Setting

Landform: Flats, swales, depressions, and low knolls on lake plains, outwash plains, and ground moraines
Shape of areas: Irregular and linear
Size of areas: 5 to 200 acres

Typical Profile

Au Gres

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 5 inches—black and grayish brown sand

Subsoil:
5 to 14 inches—dark brown and strong brown sand
14 to 33 inches—yellowish brown and brownish yellow, mottled sand

Substratum:
33 to 80 inches—light yellowish brown sand

Kinross

Organic mat:
0 to 1 inch—black, undecomposed forest litter

Surface layer:
1 to 6 inches—black muck

Subsoil:
6 to 13 inches—grayish brown sand
13 to 28 inches—dark brown and brown, mottled sand
28 to 45 inches—dark yellowish brown sand

Substratum:
45 to 80 inches—brown sand

Croswell

Organic mat:
0 to 1 inch—very dusky red, partially decomposed forest litter

Surface layer:
1 to 2 inches—black sand

Subsurface layer:
2 to 6 inches—pinkish gray sand

Subsoil:
6 to 17 inches—dark brown and brown sand
17 to 42 inches—yellowish brown and brownish yellow sand

Substratum:
42 to 80 inches—light yellowish brown and pale brown, mottled sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Au Gres—somewhat poorly drained; Kinross—very poorly drained; Croswell—moderately well drained
Seasonal high water table: Au Gres—at a depth of 0.5 foot to 1.5 feet at some time from October through May; Kinross—1 foot above to 1 foot below the surface from October through May; Croswell—at a depth of 2.0 to 3.5 feet at some time from November through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Au Gres and Croswell—severe; Kinross—moderate

Composition

Au Gres and similar soils: 30 to 50 percent
Kinross and similar soils: 25 to 30 percent
Croswell and similar soils: 20 to 25 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
- The somewhat poorly drained Finch soils in landform positions similar to or slightly higher than those of the major soils
- The very poorly drained Deford and Leafriver soils in the slightly lower landform positions

Similar inclusions:
- Soils that have a cemented subsoil
- Soils that have thin bands of loamy sand in the substratum

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, and plant competition
Management considerations:
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Au Gres and Croswell—cutbanks caving, wetness, frost action; Kinross—cutbanks caving, wetness, frost action, ponding
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by frost action.
- Because of ponding, the Kinross soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Au Gres and Croswell—wetness, rapid permeability; Kinross—wetness, rapid permeability, ponding
Management considerations:
- Mounding or adding suitable fill material helps to raise the absorption field above the water table.
- The poor filtering capacity of these soils can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
- Because of ponding, the Kinross soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: Au Gres—4w; Kinross—6w; Croswell—4s
Woodland ordination symbol: Au Gres—6W; Kinross—2W; Croswell—5S
Michigan soil management group: Au Gres—5b; Kinross—5c-a; Croswell—5a

51—Tawas-Leafriver mucks

Setting

Landform: Low flats, depressions, and drainageways on outwash plains, lake plains, and ground moraines
Shape of areas: Irregular, linear, and oval
Size of areas: 3 to more than 700 acres

Typical Profile

Tawas

Surface layer:
0 to 4 inches—very dark brown muck

Subsoil:
4 to 24 inches—black and very dark brown muck

Substratum:
24 to 80 inches—brown sand

Leafriver

Surface layer:
0 to 10 inches—black muck

Subsurface layer:
10 to 12 inches—very dark gray loamy sand

Substratum:
12 to 20 inches—light olive brown sand
20 to 80 inches—dark grayish brown, mottled sand

Soil Properties and Qualities

Permeability: Tawas—moderately slow to moderately rapid in the organic material and rapid in the underlying sandy material; Leafriver—moderate or moderately rapid in the organic material and rapid in the underlying sandy material
Available water capacity: Tawas—very high; Leafriver—moderate
Drainage class: Very poorly drained
Seasonal high water table: 1 foot above to 1 foot below the surface at some time from November through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Tawas and similar soils: 40 to 65 percent
Leafriver and similar soils: 35 to 45 percent
Contrasting inclusions: 0 to 15 percent

Inclusions

Contrasting inclusions:
• The very poorly drained Deford soils in landform positions similar to those of the Tawas and Leafriver soils
• The somewhat poorly drained Au Gres soils in the higher landform positions

Similar inclusions:
• Soils that have more sand in the surface layer
• Soils that have thin layers of loamy material

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
• Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
• Access is easiest during periods in winter when the access roads are frozen.
• Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
• Landing sites generally can be used only during the driest time of the year.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• Because of wetness, seedling mortality, and plant competition, trees are generally not planted on these soils.

Building site development

Major management concerns: Ponding
Management considerations:
• Because of ponding, these soils are generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Ponding
Management considerations:
• Because of ponding, these soils are generally unsuited to use as sites for septic tank absorption fields.

Interpretive Groups

Land capability classification: Tawas—6w; Leafriver—6w
Woodland ordination symbol: Tawas—5W; Leafriver—2W
Michigan soil management group: Tawas—M/4c; Leafriver—5c

57B—Kawkawlin loam, 1 to 4 percent slopes

Setting

Landform: Flats and low knolls on ground moraines and end moraines
Shape of areas: Irregular
Size of areas: 3 to 150 acres

Typical Profile

Surface layer:
0 to 3 inches—very dark gray loam

Subsurface layer:
3 to 5 inches—light brownish gray loam

Subsoil:
5 to 9 inches—brown clay loam surrounded by light brownish gray clay loam
9 to 32 inches—dark yellowish brown, brown, and yellowish brown, mottled clay loam

Substratum:
32 to 80 inches—brown, mottled clay loam

Soil Properties and Qualities

Permeability: Slow
Available water capacity: High
Drainage class: Somewhat poorly drained
Seasonal high water table: At a depth of 0.5 foot to 2.0 feet at some time from October through May
Surface runoff class: High
Flooding: None
Hazard of water erosion: Slight or moderate
Hazard of wind erosion: Slight

Composition

Kawkawlin and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
- The moderately well drained Nester soils in the higher landform positions
- The poorly drained Sims soils in the lower landform positions

Similar inclusions:
- Soils that have an Ap horizon
- Soils that have a surface layer of sandy loam
- Soils that have less clay throughout
- Soils that have more silt in the subsoil
- Soils that have sand below a depth of 70 inches

Use and Management

Land use: Dominant uses—pasture, idle land; other uses—cropland, forestland, building site development

Cropland

Major management concerns: Erosion hazard, wetness, tilth, nutrient loss
Management considerations:
- Conservation tillage, grassed waterways, cover crops, crop residue management, and crop rotations that include close-growing crops help to control runoff and water erosion.
- Subsurface drains can reduce the wetness if a suitable outlet is available.
- Shallow surface ditches help to remove surface water after heavy rains.
- Conservation tillage systems, contour farming, cover crops, and sod-based crop rotations can minimize the detachment and loss of nutrients associated with sediment and thus reduce the loss of solid-phase nitrogen and phosphorus.

Pasture

Major management concerns: Wetness, soil compaction
Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.
- Basing applications of lime and fertilizer on the results of soil tests helps to ensure maximum growth of plants.

Forestland

Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- Landing sites generally can be used only during the driest time of the year.
- Skidders should not be used during wet periods, when ruts form easily.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- Competing vegetation generally can be controlled by mechanical means.
- Carefully managed reforestation helps to control undesirable understory plants.

Building site development

Major management concerns: Wetness, frost action
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
- Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by frost action.

Septic tank absorption fields

Major management concerns: Wetness, slow permeability

Management considerations:
• Filling or mounding with suitable material helps to raise the absorption field above the water table.
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

Interpretive Groups

Land capability classification: 2e
Woodland ordination symbol: 3W
Michigan soil management group: 1.5b

58A—Wakeley-Allendale complex, 0 to 3 percent slopes

Setting

Landform: Low flats, depressions, and swales on ground moraines, outwash plains, and lake plains
Shape of areas: Irregular and linear
Size of areas: 10 to 200 acres

Typical Profile

Wakeley

Surface layer:
0 to 4 inches—black muck

Substratum:
4 to 21 inches—dark grayish brown and light olive gray, mottled sand
21 to 38 inches—grayish brown, mottled sand
38 to 80 inches—dark gray, mottled silty clay loam

Allendale

Organic mat:
0 to 2 inches—very dark gray, partially decomposed forest litter

Surface layer:
2 to 7 inches—gray sand

Subsoil:
7 to 11 inches—dark brown sand
11 to 26 inches—brown and yellowish brown, mottled sand
26 to 37 inches—light brownish gray, mottled sand
37 to 39 inches—reddish brown, mottled sandy loam and loamy sand
39 to 47 inches—brown, mottled clay

Substratum:
47 to 80 inches—brown, mottled silty clay

Soil Properties and Qualities

Permeability: Wakeley—rapid in the sandy part and very slow or slow in the loamy part; Allendale—rapid in the sandy part and very slow in the clayey part
Available water capacity: Wakeley—moderate; Allendale—low
Drainage class: Wakeley—very poorly drained; Allendale—somewhat poorly drained
Seasonal high water table: Wakeley—1 foot above to 1 foot below the surface at some time from October through May; Allendale—at a depth of 0.5 foot to 1.5 feet at some time from November through May
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Wakeley—moderate; Allendale—severe

Composition

Wakeley and similar soils: 50 to 60 percent
Allendale and similar soils: 40 to 50 percent
Contrasting inclusions: 0 to 10 percent

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Kawkawlin soils in landform positions similar to or slightly higher than those of the Wakeley and Allendale soils
• The moderately well drained Nester and Morganlake soils in the slightly higher landform positions

Similar inclusions:
• Soils that have more silt in the subsoil
• Soils that have thin bands of sand in the subsoil or substratum
• Soils that have clay at a depth of 70 to 80 inches

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition, wetness
Management considerations:
• The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
• Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
• Carefully managed reforestation helps to control undesirable understory plants.
• Special harvest methods may be needed to control undesirable plants.
• Windthrow can be minimized by harvest methods

that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• Trees that can withstand seasonal wetness should be selected for planting on the Allendale soil.
• Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Wakeley soil.

Building site development

Major management concerns: Wakeley—cutbanks caving, ponding; Allendale—cutbanks caving, wetness, shrinking and swelling
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• In areas of the Allendale soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• In areas of the Allendale soil, properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Because of ponding, the Wakeley soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Wakeley—slow permeability, ponding; Allendale—rapid permeability, very slow permeability, wetness
Management considerations:
• The poor filtering capacity of the Allendale soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• In areas of the Allendale soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
• In areas of the Allendale soil, filling or mounding with suitable material helps to raise the absorption field above the water table.
• Because of ponding, the Wakeley soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: Wakeley—5w; Allendale—4w
Woodland ordination symbol: Wakeley—3W; Allendale—4W
Michigan soil management group: Wakeley—4/1c; Allendale—4/1b

67A—Bowers-Deerheart complex, 0 to 3 percent slopes

Setting

Landform: Low flats and depressions on lake plains
Shape of areas: Irregular
Size of areas: 50 to 200 acres

Typical Profile

Bowers

Surface layer:
0 to 3 inches—black fine sandy loam

Subsurface layer:
3 to 16 inches—light brownish gray, mottled sandy loam

Subsoil:
16 to 20 inches—light brownish gray, mottled sandy loam surrounding brown, mottled silty clay loam
20 to 52 inches—stratified light yellowish brown and brown, mottled silty clay loam and very fine sandy loam

Substratum:
2 to 80 inches—stratified brown silty clay loam, pale yellow very fine sandy loam, light brown silt loam, and light yellowish brown loamy very fine sand and silt loam; mottled throughout

Deerheart

Surface layer:
0 to 6 inches—very dark grayish brown, mottled silt loam

Subsoil:
6 to 27 inches—gray, mottled silty clay loam
27 to 43 inches—light olive brown, mottled silty clay loam that has thin layers of silt loam and silt

Substratum:
43 to 80 inches—brown, mottled silty clay loam stratified with light olive brown very fine sandy loam, silt, and silt loam

Soil Properties and Qualities

Permeability: Slow
Available water capacity: High
Drainage class: Bowers—somewhat poorly drained; Deerheart—poorly drained

Seasonal high water table: Bowers—at a depth of 0.5 foot to 1.5 feet at some time from November through May; Deerheart—1 foot above to 1 foot below the surface at some time from October through May
Surface runoff class: High
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Slight

Composition

Bowers and similar soils: 40 to 55 percent
Deerheart and similar soils: 40 to 50 percent
Contrasting inclusions: 5 to 10 percent

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Allendale soils and the very poorly drained Wakeley and Leafriver soils in landform positions similar to those of the Bowers and Deerheart soils
• The moderately well drained Kneff soils in the higher landform positions
Similar inclusions:
• Soils that have layers of fine sand, very fine sand, or loamy very fine sand in the subsoil or substratum
• Soils that have more silt in the profile

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, plant competition, windthrow
Management considerations:
• In areas of the Bowers soil, using heavy equipment only when the soil is relatively dry, is frozen, or has adequate snow cover helps to prevent the formation of deep ruts.
• In areas of the Deerheart soil, access is easiest during periods in winter when the access roads or the soil is frozen.
• Year-round logging roads require roadfill and gravel.
• Culverts are needed in areas of the Deerheart soil to maintain the natural drainage system.
• Log landing sites are generally available in areas of the Bowers soil during the preferred operating season.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
• Trees that can withstand seasonal wetness should be selected for planting on the Bowers soil.
• Trees are generally not planted on the Deerheart soil because of wetness and plant competition.
• Competing vegetation can be controlled by mechanical or chemical means.

Building site development

Major management concerns: Bowers—seasonal wetness; Deerheart—cutbanks caving and ponding
Management considerations:
• In areas of the Bowers soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Because of ponding, the Deerheart soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Bowers—slow permeability, wetness; Deerheart—slow permeability, ponding
Management considerations:
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
• In areas of the Bowers soil, filling or mounding with suitable fill material helps to raise the absorption field above the water table.
• Because of ponding, the Deerheart soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: Bowers—2w; Deerheart—5w
Woodland ordination symbol: 7W
Michigan soil management group: Bowers—1.5b; Deerheart—1.5c

75B—Rubicon sand, 0 to 6 percent slopes

Setting

Landform: Flats and knolls on outwash plains, lake plains, moraines, and beach ridges
Shape of areas: Irregular
Size of areas: 3 to 300 acres

Typical Profile

Organic mat:
0 to 1 inch—dark brown, partially decomposed forest litter

Surface layer:
1 to 3 inches—very dark gray sand

Subsurface layer:
3 to 7 inches—brown sand

Subsoil:
7 to 31 inches—brown, dark brown, strong brown, dark yellowish brown, and brownish yellow sand
31 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Rubicon and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Croswell soils in landform positions similar to or slightly lower than those of the Rubicon soil
• The excessively drained Grayling soils in landform positions similar to those of the Rubicon soil

Similar inclusions:
• Soils that have thin bands of loamy sand in the substratum
• Soils that do not have a dark reddish brown or dark brown subsoil
• Soils that have thin bands of gravelly sand in the subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving
Management considerations:
• Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Rapid permeability
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

Interpretive Groups

Land capability classification: 6s
Woodland ordination symbol: 4S
Michigan soil management group: 5.3a

75D—Rubicon sand, 6 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on moraines, outwash plains, and beach ridges
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Organic mat:
0 to 1 inch—dark brown, partially decomposed forest litter

Surface layer:
1 to 3 inches—very dark gray sand

Subsurface layer:
3 to 7 inches—brown sand

Subsoil:
7 to 31 inches—brown, dark brown, strong brown, dark yellowish brown, and brownish yellow sand
31 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained

Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight or moderate
Hazard of wind erosion: Severe

Composition

Rubicon and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The somewhat excessively drained Graycalm and excessively drained Grayling soils in landform positions similar to those of the Rubicon soil

Similar inclusions:
• Soils that have thin bands of loamy sand in the substratum
• Soils that do not have a dark reddish brown or dark brown subsoil
• Soils that have thin bands of gravelly sand in the subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving, slope
Management considerations:
• Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Rapid permeability, slope
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: 7s
Woodland ordination symbol: 4S
Michigan soil management group: 5.3a

78—Pits, borrow

Setting

Landform: Flats and knolls on outwash plains, lake plains, beach ridges, and moraines
Shape of areas: Irregular or rectangular
Size of areas: 3 to 70 acres

Description

• This map unit consists of open excavations from which the surface layer and underlying soil material have been removed. The pits range from 4 to more than 50 feet in depth. The outer edges have steep or vertical sides. Active pits support few plants, but abandoned pits may have a sparse cover of grasses and forbs.

Composition

Pits: 100 percent

Use and Management

Land use: Source of fill material for roads, building sites, and sanitary landfills

Management considerations:
• Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Land capability classification: None assigned
Woodland ordination symbol: None assigned
Michigan soil management group: None assigned

81B—Grayling sand, 0 to 6 percent slopes

Setting

Landform: Flats and knolls on outwash plains, lake plains, and moraines
Shape of areas: Irregular
Size of areas: 5 to 1,500 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 3 inches—very dark brown sand

Subsurface layer:
3 to 4 inches—brown sand

Subsoil:
4 to 30 inches—dark yellowish brown, yellowish brown, and brownish yellow sand

Substratum:
30 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Grayling and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
- The somewhat excessively drained Graycalm soils in landform positions similar to those of the Grayling soil
- The somewhat poorly drained Croswell soils in the lower landform positions

Similar inclusions:
- Soils that have thin bands of loamy sand in the substratum
- Soils that have a dark reddish brown or dark brown subsoil
- Soils that have gravel in the subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality, seasonal droughtiness
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting when the soil is moist can reduce the seedling mortality rate.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Rapid permeability
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

Interpretive Groups

Land capability classification: 6s
Woodland ordination symbol: 4S
Michigan soil management group: 5.7a

81D—Grayling sand, 6 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on moraines and outwash plains
Shape of areas: Irregular or linear
Size of areas: 5 to 500 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 3 inches—very dark brown sand

Subsurface layer:
3 to 4 inches—brown sand

Subsoil:
4 to 30 inches—dark yellowish brown, yellowish brown, and brownish yellow sand

Substratum:
30 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight or moderate
Hazard of wind erosion: Severe

Composition

Grayling and similar soils: 90 to 95 percent
Contrasting inclusions: 5 to 10 percent

Inclusions

Contrasting inclusions:
• The somewhat excessively drained Graycalm and well drained Klacking soils in landform positions similar to those of the Grayling soil

Similar inclusions:
• Soils that have thin bands of loamy sand in the substratum
• Soils that have a dark reddish brown or dark brown subsoil
• Soils that have gravel in the subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality, seasonal droughtiness
Management considerations:
• Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Cutbanks caving, slope
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Because of the slope, this soil is poorly suited to building site development without extensive land shaping.

Septic tank absorption fields

Major management concerns: Rapid permeability, slope
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• Land shaping and installing the distribution lines across the slope help to overcome the slope.

Interpretive Groups

Land capability classification: 7s
Woodland ordination symbol: 4S
Michigan soil management group: 5.7a

81F—Grayling sand, 18 to 45 percent slopes

Setting

Landform: Escarpments, side slopes, and ridgetops on moraines and outwash plains
Shape of areas: Linear
Size of areas: 10 to 200 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 3 inches—very dark brown sand

Subsurface layer:
3 to 4 inches—brown sand

Subsoil:
4 to 30 inches—dark yellowish brown, yellowish brown, and brownish yellow sand

Substratum:
30 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Low
Flooding: None
Hazard of water erosion: Moderate or severe
Hazard of wind erosion: Severe

Composition

Grayling and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Inclusions

Contrasting inclusions:
• The somewhat excessively drained Graycalm and well drained Klacking soils in landform positions similar to those of the Grayling soil

Similar inclusions:
• Soils that have thin bands of loamy sand in the substratum
• Soils that have a dark reddish brown or dark brown subsoil
• Soils that have gravel in the subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, slope, erosion hazard, seedling mortality, seasonal droughtiness
Management considerations:
• Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
• The grade should be kept as low as possible.
• Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
• Small areas of nearly level included soils, if any are available, and suitable nearly level adjacent areas should be selected as sites for landings.
• Because of the erosion hazard, water should be removed from logging roads by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Planting when the soil is moist can reduce the seedling mortality rate.

Building site development

Major management concerns: Cutbanks caving, slope
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Because of the slope, this soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Slope
Management considerations:
• Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: 7s
Woodland ordination symbol: 4R
Michigan soil management group: 5.7a

82B—Udorthents, loamy, nearly level and undulating

Setting

Landform: Flats and low knolls on moraines and lake plains
Shape of areas: Irregular or rectangular
Size of areas: 5 to 35 acres

Typical Profile

Surface layer:
0 to 11 inches—brown clay loam

Substratum:
11 to 80 inches—brown clay loam

Soil Properties and Qualities

Permeability: Moderate
Available water capacity: Moderate
Drainage class: Well drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Variable
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Udorthents and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Inclusions

Contrasting inclusions:
• Areas of undisturbed soils
• Soils that have a surface layer of loamy sand or sand
• Soils that are somewhat poorly drained or poorly drained

Similar inclusions:
• Soils that have a surface layer of sandy loam

Use and Management

Land use: Former uses—pasture, cropland; current uses—idle land, areas excavated for topsoil

• This map unit consists of areas where topsoil has been removed and the subsoil or substratum is exposed. The exposed areas support little or no vegetation. Some inactive areas have a sparse cover of grass.
Management considerations:
• Reclamation of inactive areas helps to prevent erosion.
• Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Land capability classification: None assigned
Woodland ordination symbol: None assigned
Michigan soil management group: None assigned

83B—Udipsamments, nearly level and undulating

Setting

Landform: Flats and low knolls on outwash plains, lake plains, moraines, and beach ridges
Shape of areas: Irregular or rectangular
Size of areas: 3 to 100 acres

Typical Profile

Surface layer:
0 to 11 inches—mixed brown and pale brown sand

Substratum:
11 to 80 inches—yellowish brown and light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid or very rapid
Available water capacity: Low
Drainage class: Well drained and excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Variable
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Udipsamments and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Inclusions

Contrasting inclusions:
• Areas of undisturbed soils
• Areas that are gently rolling
• Soils that have a surface layer of sandy loam
• Soils that are somewhat poorly drained or poorly drained
Similar inclusions:
• Soils that have a surface layer of loamy sand
• Soils that have thin bands of loamy sand in the subsoil and substratum

Use and Management

Land use: Major uses—oil and gas well drilling sites, recreational areas; other uses—abandoned land

• This map unit consists of sandy areas where the surface layer and parts of the subsoil have been removed or disturbed. In some areas the original soil has been covered with sandy fill material. Most areas are barren or are only sparsely vegetated.
Management considerations:
• Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Land capability classification: None assigned
Woodland ordination symbol: None assigned
Michigan soil management group: None assigned

83F—Udipsamments, nearly level to very steep

Setting

Landform: Ridges and knolls on outwash plains, lake plains, moraines, and beach ridges
Shape of areas: Irregular or rectangular
Size of areas: 3 to 50 acres

Typical Profile

Surface layer:
0 to 11 inches—mixed brown and pale brown sand

Substratum:
11 to 80 inches—yellowish brown and light yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid or very rapid
Available water capacity: Low
Drainage class: Well drained and excessively drained
Seasonal high water table: At a depth of more than 6 feet

Surface runoff class: Variable
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Udipsamments and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Inclusions

Contrasting inclusions:
- Areas of undisturbed soils
- Areas that are nearly level and gently undulating
- Soils that have a surface layer of sandy loam

Similar inclusions:
- Soils that have a surface layer of loamy sand
- Soils that have thin bands of loamy sand in the subsoil and substratum

Use and Management

Land use: Former use—source of borrow material; current use—abandoned land

- This map unit consists of sandy areas where the surface layer and parts of the subsoil have been removed or disturbed. Most areas are barren or are only sparsely vegetated.

Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Land capability classification: None assigned
Woodland ordination symbol: None assigned
Michigan soil management group: None assigned

86—Histosols and Aquents, ponded

Setting

Landform: Flats and depressions on lake plains, outwash plains, moraines, and flood plains (fig. 4)
Shape of areas: Oval, linear, or irregular
Size of areas: 5 to 100 acres

Typical Profile

Histosols

Surface layer:
0 to 24 inches—black muck and mucky sand

Subsoil:
24 to 47 inches—brown sand

Substratum:
47 to 80 inches—grayish brown sand

Aquents

Surface layer:
0 to 4 inches—black muck

Substratum:
4 to 80 inches—dark gray sand

Soil Properties and Qualities

Permeability: Moderately slow to rapid
Available water capacity: Very high
Drainage class: Very poorly drained
Seasonal high water table: 1 foot above to 1 foot below the surface year round
Surface runoff class: Negligible
Flooding: None to frequent
Hazard of water erosion: Slight
Hazard of wind erosion: Slight

Composition

Histosols: 0 to 100 percent
Aquents: 0 to 100 percent
Contrasting inclusions: 0 to 5 percent

Contrasting Inclusions

- Small areas of poorly drained or somewhat poorly drained soils on islands

Use and Management

Land use: Wetland wildlife habitat

- This map unit consists of areas of standing water along lakes, creeks, rivers, or drainageways. Many areas are behind beaver dams and typically support vegetation, such as cattails, willow, alders, sedges, and grasses. This map unit provides habitat for wetland wildlife, such as beaver, mink, muskrat, and various species of waterfowl.

Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Land capability classification: Histosols—5w; Aquents—6w
Woodland ordination symbol: None assigned
Michigan soil management group: None assigned

87—Ausable muck, frequently flooded

Setting

Landform: Low flats and depressions along perennial rivers and creeks on flood plains

Figure 4.—Histosols and Aquents, ponded, are in the foreground. Croswell, Graycalm, and Grayling soils are in the higher forested areas in the background.

Shape of areas: Irregular and linear
Size of areas: 5 to 150 acres

Typical Profile

Surface layer:
0 to 9 inches—black muck

Substratum:
9 to 14 inches—brown sand that has thin bands of black muck
14 to 44 inches—dark grayish brown sand that has thin bands of black muck
44 to 80 inches—pale brown sand

Soil Properties and Qualities

Permeability: Moderate or moderately rapid in the organic material and rapid in the underlying sand
Available water capacity: Moderate
Drainage class: Very poorly drained
Seasonal high water table: 1 foot above to 1 foot below the surface from November through May
Surface runoff class: Negligible
Flooding: Frequent from November through May
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Ausable and similar soils: 85 to 90 percent
Contrasting inclusions: 10 to 15 percent

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Au Gres and moderately well drained Croswell soils in the higher landform positions

Similar inclusions:
• Soils that have more organic material in the subsoil and substratum
• Soils that have more silt or clay in the subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, windthrow hazard, seedling mortality, plant competition
Management considerations:
• The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
• Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
• Landing sites generally can be used only during the driest time of the year.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• After cutting, competition from brush can delay or prevent the natural regeneration of desired species.
• Special harvest methods may be needed to control undesirable plants.
• Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.

Building site development

Major management concerns: Cutbanks caving, seasonal flooding
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Because of flooding, this soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Seasonal flooding, poor filtering capacity
Management considerations:
• Because of flooding and poor filtering capacity, this soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: 7w
Woodland ordination symbol: 2W
Michigan soil management group: L-4c

90B—Chinwhisker sand, 0 to 4 percent slopes

Setting

Landform: Flats and low knolls on outwash plains
Shape of areas: Irregular
Size of areas: 3 to 150 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 3 inches—black sand

Subsurface layer:
3 to 7 inches—brown sand

Subsoil:
7 to 23 inches—brown, strong brown, and yellowish brown sand
23 to 72 inches—light yellowish and pale brown, mottled sand
72 to 80 inches—pale brown, mottled sand that has thin bands of yellowish brown loamy sand and sandy loam

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2 to 5 feet at some time from November through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Chinwhisker and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Au Gres soils in the lower landform positions
• The moderately well drained Croswell and Perecheney soils in landform positions similar to those of the Chinwhisker soil

Similar inclusions:
• Soils that have a surface layer of loamy sand
• Soils that have thin layers of loamy material

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality, plant competition
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.
• Species preference can be managed by selective cutting.
• Competing vegetation generally can be controlled by mechanical means.

Building site development

Major management concerns: Cutbanks caving, wetness
Management considerations:
• Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields

Major management concerns: Wetness, poor filtering capacity
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• Mounding or adding suitable fill material helps to raise the absorption field above the water table.

Interpretive Groups

Land capability classification: 4s
Woodland ordination symbol: 6S
Michigan soil management group: 5a

102D—Curtisville loam, 12 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on end moraines
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 4 inches—very dark gray loam

Subsoil layer:
4 to 9 inches—pale brown loam surrounding brown clay loam
9 to 16 inches—brown clay loam surrounding pale brown loam
16 to 27 inches—brown clay loam
27 to 31 inches—dark yellowish brown clay
31 to 33 inches—yellowish brown clay loam

Substratum:
33 to 80 inches—pale brown clay loam

Soil Properties and Qualities

Permeability: Slow to moderate
Available water capacity: High
Drainage class: Well drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Very high
Flooding: None
Hazard of water erosion: Moderate or severe
Hazard of wind erosion: Slight

Composition

Curtisville and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Menominee soils in landform positions similar to those of the Curtisville soil

• The somewhat poorly drained Kawkawlin and moderately well drained Nester soils in the lower landform positions

Similar inclusions:
• Soils that have more clay in the subsoil
• Soils that have a surface layer of sandy loam
• Soils that have sandy layers below a depth of 60 inches

Use and Management

Land use: Dominant use—forestland; other uses—pasture, idle land, building site development

Pasture

Major management concerns: Slope
Management considerations:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.
• Basing applications of lime and fertilizer on the results of soil tests helps to ensure maximum growth of plants.

Forestland

Major management concerns: Plant competition, equipment limitations
Management considerations:
• Skidders should not be used during wet periods, when ruts form easily.
• Special harvest methods may be needed to control undesirable plants.
• If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Slope, shrinking and swelling
Management considerations:
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Restricted permeability, slope
Management considerations:
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
• Backfilling the trenches with porous material helps to compensate for the restricted permeability.
• Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: 3L
Michigan soil management group: 1.5a

103B—Nester sandy loam, 1 to 6 percent slopes

Setting

Landform: Flats and knolls on ground moraines and end moraines
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 7 inches—very dark grayish brown sandy loam

Subsurface layer:
7 to 9 inches—brown sandy loam

Subsoil:
9 to 12 inches—strong brown clay loam surrounding pale brown sandy loam
12 to 18 inches—brown clay loam
18 to 33 inches—brown, mottled clay loam

Substratum:
33 to 42 inches—light brown, mottled clay loam
42 to 80 inches—brown clay loam

Soil Properties and Qualities

Permeability: Slow to moderate
Available water capacity: High
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.5 to 3.5 feet at some time from October through May
Surface runoff class: Very high
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Nester and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Morganlake soils in landform positions similar to those of the Nester soil
• The somewhat poorly drained Kawkawlin soils in the slightly lower landform positions
• The poorly drained Sims soils in the lower landform positions

Similar inclusions:
• Soils that have more clay in the subsoil
• Soils that have a surface layer of sandy loam
• Soils that have less clay in the subsoil
• Soils that have sand below a depth of 70 inches

Use and Management

Land use: Dominant uses—forestland, pasture, cropland; other uses—forestland, building site development

Cropland

Major management concerns: Water erosion, wind erosion, soil compaction, tilth, restricted permeability, wetness
Management considerations:
• A system of conservation tillage that leaves crop residue on the surface helps to control water erosion, helps to prevent crusting during periods of heavy rainfall, and increases the rate of water infiltration.
• Conservation tillage, crop residue management, windbreaks, and cover crops help to control wind erosion.
• Because of the restricted permeability, subsurface drains should be narrowly spaced.
• Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
• Subsurface drains can reduce the wetness if a suitable outlet is available.

Pasture

Major management concerns: Soil compaction, wetness
Management considerations:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.
• Restricted grazing during wet periods helps to prevent compaction and poor tilth.

Forestland

Major management concerns: Plant competition, equipment limitations, wetness
Management considerations:
• Skidders should not be used during wet periods, when ruts form easily.
• Special harvest methods may be needed to control undesirable plants.
• If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Shrinking and swelling
Management considerations:
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Restricted permeability, wetness
Management considerations:
• Filling or mounding with suitable material helps to raise the absorption field above the water table.
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
• Backfilling the trenches with porous material helps to compensate for the restricted permeability.

Interpretive Groups

Land capability classification: 2e
Woodland ordination symbol: 3L
Michigan soil management group: 1.5a

103C—Nester sandy loam, 6 to 12 percent slopes

Setting

Landform: Knolls and side slopes on ground moraines and end moraines
Shape of areas: Irregular and linear
Size of areas: 5 to 70 acres

Typical Profile

Surface layer:
0 to 7 inches—very dark grayish brown sandy loam

Subsurface layer:
7 to 9 inches—brown sandy loam

Subsoil:
9 to 12 inches—strong brown clay loam surrounding pale brown sandy loam

12 to 18 inches—brown clay loam
18 to 33 inches—brown, mottled clay loam

Substratum:
33 to 42 inches—light brown, mottled clay loam
42 to 80 inches—brown clay loam

Soil Properties and Qualities

Permeability: Slow to moderate
Available water capacity: High
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.5 to 3.5 feet at some time from October through May
Surface runoff class: Very high
Flooding: None
Hazard of water erosion: Moderate
Hazard of wind erosion: Moderate

Composition

Nester and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Morganlake soils in landform positions similar to those of the Nester soil
• The somewhat poorly drained Kawkawlin soils in the slightly lower landform positions
• The poorly drained Sims soils in the lower landform positions

Similar inclusions:
• Soils that have more clay in the subsoil
• Soils that have a surface layer of sandy loam
• Soils that have less clay in the subsoil
• Soils that have sand below a depth of 70 inches

Use and Management

Land use: Dominant use—forestland; other uses—pasture, cropland

Cropland
Major management concerns: Water erosion, wind erosion, soil compaction, tilth, restricted permeability, wetness
Management considerations:
• A system of conservation tillage that leaves crop residue on the surface helps to control water erosion, helps to prevent crusting during periods of heavy rainfall, and increases the rate of water infiltration.
• Conservation tillage, crop residue management, windbreaks, and cover crops help to control wind erosion.
• Because of the restricted permeability, subsurface drains should be narrowly spaced.
• Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
• Subsurface drains can reduce the wetness if a suitable outlet is available.

Pasture

Major management concerns: Soil compaction, wetness
Management considerations:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.
• Restricted grazing during wet periods helps to prevent compaction and poor tilth.

Forestland

Major management concerns: Plant competition, equipment limitations, wetness
Management considerations:
• Skidders should not be used during wet periods, when ruts form easily.
• Special harvest methods may be needed to control undesirable plants.
• If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Slope, shrinking and swelling
Management considerations:
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Restricted permeability, wetness, slope
Management considerations:
• Filling or mounding with suitable material helps to raise the absorption field above the water table.
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
• Backfilling the trenches with porous material helps to compensate for the restricted permeability.
• Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: 3e
Woodland ordination symbol: 3L
Michigan soil management group: 1.5a

114A—Ingalls sand, 0 to 3 percent slopes

Setting

Landform: Low flats and swales on lake plains and outwash plains
Shape of areas: Irregular
Size of areas: 5 to 70 acres

Typical Profile

Organic mat:
0 to 1 inch—dark brown, partially decomposed forest litter

Surface layer:
1 to 2 inches—black sand

Subsurface layer:
2 to 7 inches—brown and pinkish gray sand

Subsoil:
7 to 14 inches—dark brown, dark reddish brown, and brown sand
14 to 33 inches—strong brown, yellowish brown, and brownish yellow sand

Substratum:
33 to 80 inches—yellowish brown, stratified loamy very fine sand, very fine sand, silt loam, and very fine sandy loam

Soil Properties and Qualities

Permeability: Rapid in the sandy part and moderately slow in the stratified part
Available water capacity: Moderate
Drainage class: Somewhat poorly drained
Seasonal high water table: At a depth of 0.5 foot to 1.5 feet at some time from November through May
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Ingalls and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Croswell soils and the somewhat poorly drained Bowers and Au Gres soils in landform positions similar to those of the Ingalls soil
• The poorly drained Deerheart and Sims soils in the lower landform positions

Similar inclusions:
• Soils that do not have a dark reddish brown or dark brown subsoil
• Soils that have more sand in the substratum
• Soils that have more clay in the substratum

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition, wetness
Management considerations:
• The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
• Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
• Trees that can withstand seasonal wetness should be selected for planting.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• Carefully managed reforestation helps to control undesirable understory plants.
• Special harvest methods may be needed to control undesirable plants.
• Planting when the soil is moist can reduce the seedling mortality rate.

Building site development

Major management concerns: Cutbanks caving, wetness
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields

Major management concerns: Rapid permeability, moderately slow permeability, wetness

Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• Filling or mounding with suitable material helps to raise the absorption field above the water table.
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
• Backfilling the trenches with porous material helps to compensate for the restricted permeability.

Interpretive Groups

Land capability classification: 3w
Woodland ordination symbol: 4W
Michigan soil management group: 4/2a

120B—Morganlake sand, 0 to 6 percent slopes

Setting

Landform: Flats and knolls on moraines
Shape of areas: Irregular
Size of areas: 3 to 200 acres

Typical Profile

Surface layer:
0 to 2 inches—dark brown sand

Subsurface layer:
2 to 8 inches—brown and light yellowish brown sand
8 to 13 inches—brown and pale brown sand

Subsoil:
13 to 24 inches—brown and dark brown sand
24 to 25 inches—brown loamy sand
25 to 37 inches—brown clay loam

Substratum:
37 to 80 inches—brown clay loam

Soil Properties and Qualities

Permeability: Rapid in the sandy part and moderately slow in the loamy part
Available water capacity: Moderate
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.0 to 3.5 feet at some time from October through May
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Morganlake and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Nester soils in landform positions similar to those of the Morganlake soil
• The somewhat poorly drained Allendale and Kawkawlin soils in the lower landform positions

Similar inclusions:
• Soils that have less clay in the subsoil
• Soils that have no mottles below a depth of 20 inches
• Soils that have sandy layers below a depth of 60 inches

Use and Management

Land use: Dominant uses—forestland, idle land; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality, plant competition, seasonal droughtiness
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.
• Carefully managed reforestation helps to control undesirable understory plants.
• Special harvest methods may be needed to control undesirable plants.

Building site development

Major management concerns: Cutbanks caving, wetness
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields

Major management concerns: Rapid permeability, moderately slow permeability, wetness
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• Backfilling the trenches with porous material helps to compensate for the restricted permeability.
• Filling or mounding with suitable material helps to raise the absorption field above the water table.

Interpretive Groups

Land capability classification: 3s
Woodland ordination symbol: 6A
Michigan soil management group: 4/2a

120C—Morganlake sand, 6 to 12 percent slopes

Setting

Landform: Knolls and side slopes on moraines
Shape of areas: Irregular
Size of areas: 3 to 70 acres

Typical Profile

Surface layer:
0 to 2 inches—dark brown sand

Subsurface layer:
2 to 8 inches—brown and light yellowish brown sand
8 to 13 inches—brown and pale brown sand

Subsoil:
13 to 24 inches—brown and dark brown sand
24 to 25 inches—brown loamy sand
25 to 37 inches—brown clay loam

Substratum:
37 to 80 inches—brown clay loam

Soil Properties and Qualities

Permeability: Rapid in the sandy part and moderately slow in the loamy part
Available water capacity: Moderate
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.0 to 3.5 feet at some time from October through May
Surface runoff class: Low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Morganlake and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Menominee and Curtisville soils in landform positions similar to those of the Morganlake soil

Similar inclusions:
• Soils that have less clay in the subsoil
• Soils that have no mottles below a depth of 20 inches
• Soils that have sandy layers below a depth of 60 inches
• Soils that have a loamy substratum below a depth of 40 inches

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, plant competition, seasonal droughtiness
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.
• Carefully managed reforestation helps to control undesirable understory plants.
• Special harvest methods may be needed to control undesirable plants.

Building site development

Major management concerns: Cutbanks caving, slope, wetness
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Filling or mounding with suitable material helps to raise the absorption field above the water table.

Septic tank absorption fields

Major management concerns: Rapid permeability, moderately slow permeability, slope, wetness
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• Backfilling the trenches with porous material helps to compensate for the restricted permeability.
• Filling or mounding with suitable material helps to raise the absorption field above the water table.
• Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: 3e
Woodland ordination symbol: 6A
Michigan soil management group: 4/2a

123D—Klacking sand, 6 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on moraines and outwash plains
Shape of areas: Irregular
Size of areas: 3 to 100 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 3 inches—black sand

Subsoil:
3 to 25 inches—dark yellowish brown, brown, and yellowish brown sand
25 to 37 inches—light yellowish brown sand that has thin bands of reddish brown loamy sand
37 to 42 inches—light yellowish brown sand surrounding strong brown loamy sand and sandy loam
42 to 54 inches—brown and strong brown sandy loam surrounding light yellowish brown sand
54 to 68 inches—brown loamy sand that has bands of yellowish brown and very pale brown sand
68 to 80 inches—very pale brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Moderately rapid and rapid
Available water capacity: Low
Drainage class: Well drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight or moderate
Hazard of wind erosion: Severe

Composition

Klacking and similar soils: 85 to 90 percent
Contrasting inclusions: 10 to 15 percent

Inclusions

Contrasting inclusions:
• The excessively drained Grayling and somewhat excessively drained Graycalm soils in landform positions similar to those of the Klacking soil
• The moderately well drained Perecheney soils in the lower landform positions

Similar inclusions:
• Soils that have a loamy substratum
• Soils that have a dark reddish brown or dark brown subsoil
• Soils that have thinner layers of sand

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Seedling mortality, equipment limitations, hazard of erosion
Management considerations:
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Because of the erosion hazard, water should be removed from logging roads by water bars, out-sloping

or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.

Building site development

Major management concerns: Slope, cutbanks caving
Management considerations:
• Because of the slope, this soil is poorly suited to building site development without extensive land shaping.
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Slope
Management considerations:
• Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: 6S
Michigan soil management group: 4a

144B—Perecheney sand, 0 to 6 percent slopes

Setting

Landform: Flats and low knolls on lake plains and outwash plains
Shape of areas: Irregular
Size of areas: 3 to 200 acres

Typical Profile

Organic mat:
0 to 2 inches—dark brown, partially decomposed forest litter

Surface layer:
2 to 3 inches—black sand

Subsurface layer:
3 to 5 inches—grayish brown sand

Subsoil:
5 to 28 inches—strong brown sand
28 to 34 inches—brown, mottled loam surrounding light brownish gray loamy sand
34 to 46 inches—brown, mottled clay loam
46 to 71 inches—brown loam
71 to 80 inches—light yellowish brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Rapid in the sandy material and moderately slow or moderate in the loamy material
Available water capacity: Moderate
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.0 to 3.5 feet at some time from November through May
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Perecheney and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Morganlake, Kellogg, and Croswell soils in landform positions similar to or slightly lower than those of the Perecheney soil
• The well drained Klacking and somewhat excessively drained Graycalm soils in the slightly higher landform positions
Similar inclusions:
• Soils that have less clay in the subsoil
• Soils that have a dark reddish brown or dark brown subsoil
• Soils that have clay below a depth of 60 inches

Use and Management

Land use: Dominant use—forestland; other uses—pasture, building site development

Pasture

Major management concerns: Soil compaction
Management considerations:
• Proper stocking rates, a planned grazing system, and deferred grazing during dry periods help to keep the pasture in good condition.
• Basing applications of lime and fertilizer on the results of soil tests helps to ensure maximum growth of plants.

Forestland

Major management concerns: Equipment limitations, seedling mortality
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting seedlings when the soil is moist and planting special nursery stock can reduce the seedling

mortality rate. Replanting may be needed in some areas.

Building site development

Major management concerns: Cutbanks caving, wetness
Management considerations:
• Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields

Major management concerns: Wetness, moderately slow permeability
Management considerations:
• Filling or mounding with suitable fill material helps to raise the absorption field above the water table.
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

Interpretive Groups

Land capability classification: 4s
Woodland ordination symbol: 6S
Michigan soil management group: 4/2a

144C—Perecheney sand, 6 to 12 percent slopes

Setting

Landform: Low knolls and side slopes on outwash plains
Shape of areas: Irregular and linear
Size of areas: 3 to 70 acres

Typical Profile

Organic mat:
0 to 2 inches—dark brown, partially decomposed forest litter

Surface layer:
2 to 3 inches—black sand

Subsurface layer:
3 to 5 inches—grayish brown sand

Subsoil:
5 to 28 inches—strong brown sand
28 to 34 inches—brown, mottled loam surrounding light brownish gray loamy sand
34 to 46 inches—brown, mottled clay loam
46 to 71 inches—brown loam
71 to 80 inches—light yellowish brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Rapid in the sandy material and moderately slow or moderate in the loamy material
Available water capacity: Moderate
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.0 to 3.5 feet at some time from November through May
Surface runoff class: Low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Perecheney and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Klacking and somewhat excessively drained Graycalm soils in the slightly higher landform positions
Similar inclusions:
• Soils that have less clay in the subsoil
• Soils that have a dark reddish brown or dark brown subsoil
• Soils that have clay below a depth of 60 inches

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations and seedling mortality
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting seedlings when the soil is moist and planting special nursery stock can reduce the seedling mortality rate. Replanting may be needed in some areas.

Building site development

Major management concerns: Cutbanks caving, wetness
Management considerations:
• Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage

system around structures with basements and crawl spaces.

Septic tank absorption fields

Major management concerns: Wetness, moderately slow permeability
Management considerations:
• Filling or mounding with suitable fill material helps to raise the absorption field above the water table.
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

Interpretive Groups

Land capability classification: 4s
Woodland ordination symbol: 6S
Michigan soil management group: 4/2a

159A—Finch sand, 0 to 3 percent slopes

Setting

Landform: Low flats and swales on lake plains and outwash plains
Shape of areas: Irregular and linear
Size of areas: 3 to 60 acres

Typical Profile

Organic mat:
0 to 3 inches—black, partially decomposed forest litter

Surface layer:
3 to 5 inches—black sand

Subsurface layer:
5 to 16 inches—light brownish gray and grayish brown sand

Subsoil:
16 to 20 inches—dark reddish brown, mottled sand
20 to 45 inches—dark brown, brown, and strong brown, mottled sand

Substratum:
45 to 80 inches—brown, mottled sand

Soil Properties and Qualities

Permeability: Moderate to rapid
Available water capacity: Low
Drainage class: Somewhat poorly drained
Seasonal high water table: At a depth of 0.5 foot to 1.5 feet at some time from November through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Finch and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The poorly drained Kinross soils in the lower landform positions
• The moderately well drained Proper soils in the higher landform positions
• The somewhat poorly drained Au Gres soils in landform positions similar to those of the Finch soil

Similar inclusions:
• Soils that do not have a cemented subsoil
• Soils that have loam below a depth of 60 inches
• Soils that have thin bands of loamy sand in the subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, plant competition, seedling mortality, windthrow hazard, wetness
Management considerations:
• The seasonal high water table restricts the use of equipment to midsummer, when soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Trees that can withstand seasonal wetness should be selected for planting.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• If trees are planted, site preparation is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.
• Planting when the soil is moist can reduce the seedling mortality rate.

Building site development

Major management concerns: Cutbanks caving, wetness
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields

Major management concerns: Wetness, moderately rapid permeability
Management considerations:
• Filling or mounding with suitable material helps to raise the absorption field above the water table.
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

Interpretive Groups

Land capability classification: 4w
Woodland ordination symbol: 4W
Michigan soil management group: 5b-h

307B—Klacking sand, 0 to 6 percent slopes

Setting

Landform: Flats and low knolls on outwash plains and moraines
Shape of areas: Irregular
Size of areas: 3 to 300 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 3 inches—black sand

Subsoil:
3 to 25 inches—dark yellowish brown, brown, and yellowish brown sand
25 to 37 inches—light yellowish brown sand that has thin bands of reddish brown loamy sand
37 to 42 inches—light yellowish brown sand surrounding strong brown loamy sand and sandy loam
42 to 54 inches—brown and strong brown sandy loam surrounding light yellowish brown sand
54 to 68 inches—brown loamy sand with bands of yellowish brown and very pale brown sand
68 to 80 inches—very pale brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Moderately rapid or rapid
Available water capacity: Low
Drainage class: Well drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Klacking and similar soils: 85 to 90 percent
Contrasting inclusions: 10 to 15 percent

Inclusions

Contrasting inclusions:
• The excessively drained Grayling and somewhat excessively drained Graycalm soils in landform positions similar to those of the Klacking soil
• The moderately well drained Perecheney soils in landform positions similar to and slightly lower than those of the Klacking soil

Similar inclusions:
• Soils that have a loamy substratum
• Soils that have a dark reddish brown or dark brown subsoil
• Soils that have thinner layers of sand

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Seedling mortality
Management considerations:
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Cutbanks caving
Management considerations:
• Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: There are no major management concerns affecting the use of this soil as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: 3s
Woodland ordination symbol: 6S
Michigan soil management group: 4a

307E—Klacking sand, 18 to 35 percent slopes

Setting

Landform: Escarpments, side slopes, and ridgetops on moraines and outwash plains
Shape of areas: Irregular
Size of areas: 3 to 50 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 3 inches—black sand

Subsoil:
3 to 25 inches—dark yellowish brown, brown, and yellowish brown sand
25 to 37 inches—light yellowish brown sand that has thin bands of reddish brown loamy sand
37 to 42 inches—light yellowish brown sand surrounding strong brown loamy sand and sandy loam
42 to 54 inches—brown and strong brown sandy loam surrounding light yellowish brown sand
54 to 68 inches—brown loamy sand with bands of yellowish brown and very pale brown sand
68 to 80 inches—very pale brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Moderately rapid or rapid
Available water capacity: Low
Drainage class: Well drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Low
Flooding: None
Hazard of water erosion: Moderate or severe
Hazard of wind erosion: Severe

Composition

Klacking and similar soils: 85 to 90 percent
Contrasting inclusions: 10 to 15 percent

Inclusions

Contrasting inclusions:
• The excessively drained Grayling, somewhat excessively drained Graycalm, and well drained Menominee soils in landform positions similar to those of the Klacking soil

Similar inclusions:
• Soils that have a loamy substratum
• Soils that have a dark reddish brown or dark brown subsoil
• Soils that have thinner layers of sand

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Seedling mortality, equipment limitations, hazard of erosion
Management considerations:
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Because of the erosion hazard, water should be removed from logging roads by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.

Building site development

Major management concerns: Slope, cutbanks caving
Management considerations:
• Because of the slope, this soil is poorly suited to building site development without extensive land shaping.
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Slope
Management considerations:
• Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: 6R
Michigan soil management group: 4a

360—Wakeley muck

Setting

Landform: Low flats, swales, and depressions on outwash plains and lake plains
Shape of areas: Irregular
Size of areas: 5 to 500 acres

Typical Profile

Surface layer:
0 to 4 inches—black muck

Substratum:
4 to 21 inches—dark grayish brown and light olive gray, mottled sand
21 to 38 inches—grayish brown, mottled sand
38 to 80 inches—dark gray, mottled silty clay loam

Soil Properties and Qualities

Permeability: Rapid in the sandy part and very slow or slow in the loamy part
Available water capacity: Moderate
Drainage class: Very poorly drained
Seasonal high water table: 1 foot above to 1 foot below the surface from October through May
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Wakeley and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The very poorly drained Tawas and Deford soils in landform positions similar to those of the Wakeley soil

Similar inclusions:
• Soils that have a surface layer of mucky sand
• Soils that have less clay in the substratum

Use and Management

Land use: Dominant use—forestland; other uses—idle land

Forestland

Major management concerns: Equipment limitations, windthrow hazard, seedling mortality, plant competition
Management considerations:
• The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
• Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
• Landing sites generally can be used only during the driest time of the year.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• After cutting, competition from brush can delay or prevent the natural regeneration of desired species.
• Special harvest methods may be needed to control undesirable plants.
• Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.

Building site development

Major management concerns: Ponding
Management considerations:
• Because of ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Slow permeability, ponding
Management considerations:
• Because of restricted permeability and ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: 5w
Woodland ordination symbol: 3W
Michigan soil management group: 4/1c

368A—Au Gres-Deford complex, 0 to 3 percent slopes

Setting

Landform: Low flats and depressions on outwash plains and lake plains
Shape of areas: Irregular and linear
Size of areas: 5 to 100 acres

Typical Profile

Au Gres

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 5 inches—black and grayish brown sand

Subsoil:
5 to 14 inches—dark brown and strong brown sand
14 to 33 inches—yellowish brown and brownish yellow, mottled sand

Substratum:
33 to 80 inches—light yellowish brown sand

Deford

Surface layer:
0 to 1 inch—black muck

Subsurface layer:
1 to 2 inches—black mucky sand

Substratum:
2 to 80 inches—grayish brown, light gray, brown, pale brown, and yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Au Gres—somewhat poorly drained; Deford—very poorly drained
Seasonal high water table: Au Gres—at a depth of 0.5 foot to 1.5 feet at some time from October through May; Deford—1 foot above to 1 foot below the surface at some time from October through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Au Gres—severe; Deford—moderate

Composition

Au Gres and similar soils: 30 to 70 percent
Deford and similar soils: 25 to 55 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Croswell soils in the higher landform positions
• The somewhat excessively drained Otisco soils in landform positions similar to or slightly lower than those of the Au Gres and Deford soils
• The very poorly drained Kinross soils in the lower landform positions

Similar inclusions:
• Soils that have a cemented subsoil
• Soils that have thin bands of loamy sand in the substratum

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
• The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• If trees are planted, site preparation is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Au Gres—cutbanks caving, wetness, frost action; Deford—cutbanks caving, wetness, frost action, ponding
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by frost action.
• Because of ponding, the Deford soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Au Gres—wetness, rapid permeability; Deford—wetness, rapid permeability, ponding
Management considerations:
• Mounding or adding suitable fill material helps to raise the absorption field above the water table.
• The poor filtering capacity of these soils can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

• Because of ponding, the Deford soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: Au Gres—4w; Deford—5w
Woodland ordination symbol: Au Gres—6W; Deford—4W
Michigan soil management group: Au Gres—5b; Deford—4c

369—Deford muck

Setting

Landform: Low flats, swales, and depressions on lake plains and outwash plains
Shape of areas: Irregular
Size of areas: 3 to 200 acres

Typical Profile

Surface layer:
0 to 1 inch—black muck

Subsurface layer:
1 to 2 inches—black mucky sand

Substratum:
2 to 80 inches—grayish brown, light gray, brown, pale brown, and yellowish brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Very poorly drained
Seasonal high water table: 1 foot above to 1 foot below the surface at some time from October through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Deford and similar soils: 90 to 95 percent
Contrasting inclusions: 5 to 10 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Croswell soils in the higher landform positions
• The somewhat excessively drained Au Gres and Otisco soils in landform positions similar to or slightly lower than those of the Deford soil
• The very poorly drained Tawas, Leafriver, and Kinross soils in landform positions similar to those of the Deford soil

Similar inclusions:
• Soils that have a cemented subsoil
• Soils that have thin bands of loamy sand in the substratum
• Soils that have more gravel in the substratum

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Plant competition, seedling mortality, equipment limitations, windthrow hazard, wetness
Management considerations:
• The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has adequate snow cover.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.

Building site development

Major management concerns: Ponding
Management considerations:
• Because of ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Ponding
Management considerations:
• Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: 5w
Woodland ordination symbol: 4W
Michigan soil management group: 4c

380—Access denied

Shape of areas: Square or rectangular
Size of areas: 20 to 1,000 acres

Use and Management

Management considerations:
• Because access to these areas was denied, no interpretations are available. Onsite investigation is needed.

Interpretive Groups

Land capability classification: None assigned
Woodland ordination symbol: None assigned
Michigan soil management group: None assigned

382B—Proper sand, 0 to 6 percent slopes

Setting

Landform: Flats and low knolls on beach ridges and dunes
Shape of areas: Irregular and linear
Size of areas: 3 to 50 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 4 inches—black sand

Subsurface layer:
4 to 11 inches—light brownish gray and light gray sand

Subsoil:
11 to 23 inches—dark reddish brown, yellowish red, and strong brown sand
23 to 47 inches—yellowish brown and light yellowish brown, mottled sand

Substratum:
47 to 80 inches—light gray sand

Soil Properties and Qualities

Permeability: Moderate to rapid
Available water capacity: Low
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.0 to 3.5 feet at some time from November through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Proper and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The poorly drained Kinross soils in the lower landform positions
• The somewhat poorly drained Ingalls, Finch, and Au Gres soils in landform positions similar to those of the Proper soil

Similar inclusions:
• Soils that do not have a cemented subsoil
• Soils that have loam below a depth of 60 inches
• Soils that have thin bands of loamy sand in the subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
• Species preference can be managed by selective cutting.
• Competing vegetation generally can be controlled by mechanical means.
• Carefully managed reforestation helps to control undesirable understory plants.

Building site development

Major management concerns: Cutbanks caving, wetness
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields

Major management concerns: Poor filtering capacity, wetness

Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water.
• Filling or mounding with suitable material helps to raise the absorption field above the water table.

Interpretive Groups

Land capability classification: 4s
Woodland ordination symbol: 5W
Michigan soil management group: 5a-h

408—Sims loam

Setting

Landform: Low flats, swales, and depressions on ground moraines and end moraines
Shape of areas: Irregular
Size of areas: 3 to 100 acres

Typical Profile

Surface layer:
0 to 9 inches—very dark gray loam

Subsoil:
9 to 51 inches—brown and light brownish gray, mottled clay loam

Substratum:
51 to 80 inches—light gray, mottled clay loam

Soil Properties and Qualities

Permeability: Slow
Available water capacity: High
Drainage class: Very poorly drained
Seasonal high water table: 1 foot above to 1 foot below the surface at some time from November through May
Surface runoff class: High
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Slight

Composition

Sims and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Kawkawlin soils in the higher landform positions
• The very poorly drained Wakeley soils in landform positions similar to those of the Sims soil

Similar inclusions:
• Soils that have a surface layer of sandy loam
• Soils that have less clay throughout
• Soils that have more silt in the subsoil

Use and Management

Land use: Dominant uses—forestland, idle land

Forestland

Major management concerns: Wetness, seedling mortality, windthrow, plant competition
Management considerations:
• The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
• Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
• Carefully managed reforestation helps to control undesirable understory plants.
• Special harvest methods may be needed to control undesirable plants.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• Trees that can withstand seasonal wetness should be selected for planting.
• Special harvest methods may be needed to control undesirable plants.
• Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.

Building site development

Major management concerns: Ponding, shrinking and swelling
Management considerations:
• Because of ponding, this soil is generally unsuited to building site development.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Ponding, slow permeability
Management considerations:
• Because of ponding and slow permeability, this soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: 5w
Woodland ordination symbol: 4W
Michigan soil management group: 1.5c

410B—Proper-Finch-Deford complex, 0 to 6 percent slopes

Setting

Landform: Low knolls, flats, swales, and shallow depressions on outwash plains, lake plains, beach ridges, and dunes
Shape of areas: Irregular
Size of areas: 3 to 70 acres

Typical Profile

Proper

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 4 inches—black sand

Subsurface layer:
4 to 11 inches—light brownish gray and light gray sand

Subsoil:
11 to 23 inches—dark reddish brown, yellowish red, and strong brown sand
23 to 47 inches—yellowish brown and light yellowish brown, mottled sand

Substratum:
47 to 80 inches—light gray sand

Finch

Organic mat:
0 to 3 inches—black, partially decomposed forest litter

Surface layer:
3 to 5 inches—black sand
Surface layer:
5 to 16 inches—light brownish gray and grayish brown sand

Subsoil:
16 to 20 inches—dark reddish brown, mottled sand
20 to 45 inches—dark brown, brown, and strong brown, mottled sand

Substratum:
45 to 80 inches—brown, mottled sand

Deford

Surface layer:
0 to 1 inch—black muck

Subsurface layer:
1 to 2 inches—black mucky sand

Substratum:
2 to 80 inches—light gray, brown, pale brown, and yellowish brown sand

Soil Properties and Qualities

Permeability: Proper—moderate to rapid; Finch—moderate to rapid; Deford—rapid
Available water capacity: Low
Drainage class: Proper—moderately well drained; Finch—somewhat poorly drained; Deford—very poorly drained
Seasonal high water table: Proper—at a depth of 2.0 to 3.5 feet at some time from November through May; Finch—at a depth of 0.5 foot to 1.5 feet at some time from November through May; Deford—1 foot above to 1 foot below the surface at some time from October through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Proper—severe; Finch—severe; Deford—moderate

Composition

Proper and similar soils: 50 to 60 percent
Finch and similar soils: 25 to 50 percent
Deford and similar soils: 15 to 30 percent
Contrasting inclusions: 0 to 10 percent

Inclusions

Contrasting inclusions:
- The somewhat poorly drained Au Gres soils in landform positions similar to those of the major soils
- The moderately well drained Croswell soils in the higher landform positions
- The very poorly drained Leafriver and Tawas soils in the lower landform positions

Similar inclusions:
- Soils that have thin bands of loamy sand in the substratum
- Soils that do not have a dark reddish brown or dark brown subsoil
- Soils that have more silt in the substratum

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
• Using heavy equipment only when the soil is relatively dry, is frozen, or has an adequate snow cover helps to prevent the formation of deep ruts.
• Year-round logging roads require roadfill and gravel. Culverts are needed in areas of the Proper soil to maintain the natural drainage system.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
• Trees are generally not planted on the Proper soil because of wetness, severe seedling mortality, and plant competition

Building site development

Major management concerns: Proper—cutbanks caving, seasonal wetness; Finch—cutbanks caving, seasonal wetness; Deford—cutbanks caving, ponding
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Because of ponding, the Deford soil is generally unsuited to building site development.
• In areas of the Proper and Finch soils, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields

Major management concerns: Proper and Finch—rapid permeability, seasonal wetness; Deford—rapid permeability, ponding
Management considerations:
• The poor filtering capacity of these soils can result in the pollution of ground water.
• Because of ponding, the Deford soil is generally unsuited to use as a site for septic tank absorption fields.
• In areas of the Proper and Finch soils, filling or mounding with suitable fill material helps to raise the absorption field above the water table.

Interpretive Groups

Land capability classification: Proper—4s; Finch—4w; Deford—5w
Woodland ordination symbol: Proper—5W; Finch—4W; Deford—4W
Michigan soil management group: Proper—5a-h; Finch—5b-h; Deford—4c

429D—Menominee sand, 12 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on ground moraines and end moraines
Shape of areas: Irregular and linear
Size of areas: 10 to 70 acres

Typical Profile

Surface layer:
0 to 4 inches—very dark grayish brown sand

Subsurface layer:
4 to 7 inches—grayish brownish sand

Subsoil:
7 to 23 inches—dark brown and dark yellowish brown sand
23 to 39 inches—brown clay loam surrounding light brownish gray sandy loam
39 to 59 inches—reddish brown clay loam

Substratum:
59 to 80 inches—brown loam

Soil Properties and Qualities

Permeability: Rapid in the sandy part and moderately slow in the loamy part
Available water capacity: Moderate
Drainage class: Well drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Low
Flooding: None
Hazard of water erosion: Slight or moderate
Hazard of wind erosion: Severe

Composition

Menominee and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Curtisville and somewhat excessively drained Graycalm soils in landform positions similar to those of the Menominee soil

Similar inclusions:
- Soils that have more clay in the substratum
- Soils that have mottles below a depth of 40 inches
- Soils that have sandy layers below a depth of 60 inches

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, slope, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.

Building site development

Major management concerns: Slope, cutbanks caving
Management considerations:
- Because of the slope, this soil is poorly suited to building site development without extensive land shaping.
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Slope, restricted permeability
Management considerations:
- Land shaping and installing the distribution lines on the contour can help to overcome the slope.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: 6S
Michigan soil management group: 4/2a

441B—Morganlake-Nester complex, 0 to 6 percent slopes

Setting

Landform: Flats and knolls on moraines
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Morganlake

Surface layer:
0 to 2 inches—dark brown sand

Subsurface layer:
2 to 8 inches—brown and light yellowish gray sand
8 to 13 inches—brown sand

Subsoil:
13 to 24 inches—brown and dark brown sand
24 to 25 inches—brown loamy sand
25 to 37 inches—brown clay loam

Substratum:
37 to 80 inches—brown clay loam

Nester

Surface layer:
0 to 7 inches—very dark grayish brown sandy loam

Subsurface layer:
7 to 9 inches—brown sandy loam

Subsoil:
9 to 12 inches—brown clay loam surrounding pale brown sandy loam
12 to 18 inches—brown clay loam
18 to 33 inches—brown, mottled clay loam

Substratum:
33 to 42 inches—light brown, mottled clay loam
42 to 80 inches—brown clay loam

Soil Properties and Qualities

Permeability: Morganlake—rapid in the sandy part and moderately slow in the loamy part; Nester—slow to moderate
Available water capacity: Morganlake—moderate; Nester—high
Drainage class: Moderately well drained
Seasonal high water table: Morganlake—at a depth of 2.0 to 3.5 feet from October through May; Nester—at a depth of 2.5 to 3.5 feet from November through May
Surface runoff class: Morganlake—very low; Nester—high
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Morganlake—severe; Nester—moderate

Composition

Morganlake and similar soils: 45 to 60 percent
Nester and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 10 percent

Inclusions

Contrasting inclusions:
• The well drained Rubicon and Klacking soils in landform positions similar to those of the Morganlake and Nester soils
• The moderately well drained Perecheney soils in the slightly lower landform positions
• The somewhat excessively drained Graycalm soils in landform positions similar to those of the Morganlake and Nester soils

Similar inclusions:
• Soils that have less clay in the subsoil
• Soils that have no mottles below a depth of 20 inches
• Soils that have more clay in the subsoil
• Soils that have sandy layers below a depth of 60 inches

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Morganlake—equipment limitations, seedling mortality; Nester—plant competition
Management considerations:
• Special harvest methods may be needed to control undesirable plants in areas of the Nester soil.
• If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• The nearly level areas should be selected as sites for landings.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Morganlake—cutbanks caving, wetness; Nester—shrinking and swelling
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Restricted permeability
Management considerations:
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

Interpretive Groups

Land capability classification: Morganlake—3s; Nester—2e
Woodland ordination symbol: Morganlake—6A; Nester—3L
Michigan soil management group: Morganlake—4/2a; Nester—1.5a

441C—Morganlake-Nester complex, 6 to 12 percent slopes

Setting

Landform: Knolls and side slopes on moraines
Shape of areas: Irregular and linear
Size of areas: 5 to 70 acres

Typical Profile

Morganlake

Surface layer:
0 to 2 inches—dark brown sand

Subsurface layer:
2 to 8 inches—brown and light yellowish gray sand
8 to 13 inches—brown sand

Subsoil:
13 to 24 inches—brown and dark brown sand
24 to 25 inches—brown loamy sand
25 to 37 inches—brown clay loam

Substratum:
37 to 80 inches—brown clay loam

Nester

Surface layer:
0 to 7 inches—very dark grayish brown sandy loam

Subsurface layer:
7 to 9 inches—brown sandy loam

Subsoil:
9 to 12 inches—brown clay loam surrounding pale brown sandy loam
12 to 18 inches—brown clay loam
18 to 33 inches—brown, mottled clay loam

Substratum:
33 to 42 inches—light brown, mottled clay loam
42 to 80 inches—brown clay loam

Soil Properties and Qualities

Permeability: Morganlake—rapid in the sandy part and moderately slow in the loamy part; Nester—slow to moderate
Available water capacity: Morganlake—moderate; Nester—high
Drainage class: Moderately well drained
Seasonal high water table: Morganlake—at a depth of 2.0 to 3.5 feet from October through May; Nester—at a depth of 2.5 to 3.5 feet from November through May
Surface runoff class: Morganlake—low; Nester—very high
Flooding: None
Hazard of water erosion: Morganlake—slight; Nester—moderate
Hazard of wind erosion: Moderate

Composition

Morganlake and similar soils: 40 to 60 percent
Nester and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 10 percent

Inclusions

Contrasting inclusions:
- The well drained Rubicon, Menominee, and Curtisville soils in landform positions similar to those of the Morganlake and Nester soils
- The somewhat poorly drained Kawkawlin soils in the lower landform positions
- The moderately well drained Perecheney soils in the slightly lower landform positions
- The somewhat excessively drained Graycalm soils in landform positions similar to those of the Morganlake and Nester soils

Similar inclusions:
- Soils that have less clay in the subsoil
- Soils that have no mottles below a depth of 20 inches
- Soils that have a surface layer of sandy loam

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Morganlake—slope, equipment limitations, seedling mortality; Nester—slope, plant competition
Management considerations:
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Morganlake—slope, cutbanks caving, wetness; Nester—slope, shrinking and swelling
Management considerations:
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
- Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Slope, restricted permeability
Management considerations:
- Land shaping and installing the distribution lines on the contour can help to overcome the slope.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

Interpretive Groups

Land capability classification: Morganlake—3e; Nester—3e
Woodland ordination symbol: Morganlake—6A; Nester—3L

Michigan soil management group: Morganlake—4/2a; Nester—1.5a

442D—Menominee-Curtisville complex, 12 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on ground moraines and end moraines
Shape of areas: Irregular and linear
Size of areas: 5 to 100 acres

Typical Profile

Menominee

Surface layer:
0 to 4 inches—very dark grayish brown sand

Subsurface layer:
4 to 7 inches—grayish brownish sand

Subsoil:
7 to 23 inches—dark brown and dark yellowish brown sand
23 to 39 inches—brown clay loam surrounding light brownish gray sandy loam
39 to 59 inches—reddish brown clay loam

Substratum:
59 to 80 inches—brown loam

Curtisville

Surface layer:
0 to 4 inches—very dark gray loam

Subsurface layer:
4 to 9 inches—pale brown loam surrounding brown clay loam

Subsoil:
9 to 16 inches—brown clay loam surrounding pale brown loam
16 to 27 inches—brown clay loam
27 to 31 inches—dark yellowish brown clay
31 to 33 inches—yellowish brown clay loam

Substratum:
33 to 80 inches—pale brown clay loam

Soil Properties and Qualities

Permeability: Menominee—rapid in the upper sandy part and moderately slow in the loamy part; Curtisville—slow to moderate
Available water capacity: Menominee—moderate; Curtisville—high
Drainage class: Well drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Menominee—low; Curtisville—very high
Flooding: None
Hazard of water erosion: Menominee—slight or moderate; Curtisville—moderate or severe
Hazard of wind erosion: Menominee—severe; Curtisville—slight

Composition

Menominee and similar soils: 45 to 60 percent
Curtisville and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 10 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Morganlake and somewhat excessively drained Graycalm soils in landform positions similar to those of the Menominee and Curtisville soils

Similar inclusions:
• Soils that have more clay in the substratum
• Soils that have mottles below a depth of 40 inches
• Soils that have sandy layers below a depth of 60 inches
• Soils that have a surface layer of sandy loam

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Menominee—slope, equipment limitations, seedling mortality; Curtisville—plant competition, slope
Management considerations:
• Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
• Special harvest methods may be needed to control undesirable plants in areas of the Curtisville soil.
• If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Menominee—slope, cutbanks caving; Curtisville—slope, shrinking and swelling
Management considerations:
• Because of the slope, these soils are poorly suited to building site development without extensive land shaping.
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Slope, restricted permeability
Management considerations:
• Land shaping and installing the distribution lines on the contour can help to overcome the slope.
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

Interpretive Groups

Land capability classification: Menominee—4e; Curtisville—4e
Woodland ordination symbol: Menominee—6S; Curtisville—3L
Michigan soil management group: Menominee—4/2a; Curtisville—3/2a

473—Deford-Kinross mucks

Setting

Landform: Low flats, swales, and depressions on lake plains and outwash plains
Shape of areas: Irregular
Size of areas: 5 to 120 acres

Typical Profile

Deford

Surface layer:
0 to 1 inch—black muck

Subsurface layer:
1 to 2 inches—black mucky sand

Substratum:
2 to 80 inches—grayish brown, light gray, brown, pale brown, and yellowish brown sand

Kinross

Organic mat:
0 to 1 inch—black, undecomposed forest litter

Surface layer:
1 to 6 inches—black muck

Subsoil:
6 to 13 inches—grayish brown sand
13 to 28 inches—dark brown and brown, mottled sand
28 to 45 inches—dark yellowish brown sand

Substratum:
45 to 80 inches—brown sand

Soil Properties and Qualities

Permeability: Rapid
Available water capacity: Low
Drainage class: Very poorly drained
Seasonal high water table: 1 foot above to 1 foot below the surface from October through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Deford—severe; Kinross—moderate

Composition

Deford and similar soils: 35 to 70 percent
Kinross and similar soils: 30 to 50 percent
Contrasting inclusions: 0 to 15 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Croswell soils in the higher landform positions
• The somewhat excessively drained Au Gres soils in landform positions similar to or slightly lower than those of the Deford and Kinross soils
• The very poorly drained Tawas and Leafriver soils in the lower landform positions

Similar inclusions:
• Soils that have a cemented subsoil
• Soils that have thin bands of loamy sand in the substratum
• Soils that have a seasonal high water table at a depth of 1 to 2 feet

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations,

seedling mortality, windthrow hazard, plant competition

Management considerations:

- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Cutbanks caving, ponding, wetness, frost action

Management considerations:

- Because of ponding, these soils are generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Ponding, wetness, rapid permeability

Management considerations:

- Because of ponding and a poor filtering capacity, these soils are generally unsuited to use as sites for septic tank absorption fields.

Interpretive Groups

Land capability classification: Deford—5w; Kinross—6w

Woodland ordination symbol: Deford—4W; Kinross—2W

Michigan soil management group: Deford—4c; Kinross—5c-a

474—Histosols-Fluvaquents complex, frequently flooded

Setting

Landform: Low flats and depressions along perennial rivers and creeks on lake plains, outwash plains, moraines, and flood plains

Shape of areas: Irregular

Size of areas: 5 to 100 acres

Soil Properties and Qualities

Texture: Histosols—muck; Fluvaquents—muck and stratified loamy fine sand to silt loam

Available water capacity: Histosols—very high; Fluvaquents—variable

Drainage class: Very poorly drained

Seasonal high water table: Histosols—1 foot above to 1 foot below the surface year round; Fluvaquents—1 foot above to 1 foot below the surface from October through June

Surface runoff class: Negligible

Flooding: Frequent from January through December

Hazard of water erosion: Histosols—moderate; Fluvaquents—slight or moderate

Hazard of wind erosion: Histosols—moderate; Fluvaquents—variable

Composition

Histosols: 30 to 70 percent

Fluvaquents: 30 to 55 percent

Contrasting inclusions: 0 to 15 percent

Contrasting Inclusions

- Small areas of poorly drained or somewhat poorly drained soils on islands

Use and Management

Land use: Wetland wildlife habitat

Management considerations:

- Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Land capability classification: Histosols—5w; Fluvaquents—5w

Woodland ordination symbol: None assigned

Michigan soil management group: None assigned

475B—Graycalm-Klacking sands, 0 to 6 percent slopes

Setting

Landform: Flats and knolls on outwash plains and moraines

Shape of areas: Irregular and linear

Size of areas: 5 to 700 acres

Typical Profile

Graycalm

Surface layer:

0 to 2 inches—black sand

Subsoil:

2 to 27 inches—dark yellowish brown and yellowish brown sand

27 to 80 inches—brownish yellow sand that has

thin bands of strong brown and brown loamy sand

Klacking

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 3 inches—black sand

Subsoil:
3 to 25 inches—dark yellowish brown, brown, and yellowish brown sand
25 to 37 inches—light yellowish brown sand that has thin bands of reddish brown loamy sand
37 to 42 inches—light yellowish brown sand surrounding strong brown loamy sand and sandy loam
42 to 54 inches—brown and strong brown sandy loam surrounding light yellowish brown sand
54 to 68 inches—brown loamy sand that has bands of yellowish brown and very pale brown sand
68 to 80 inches—very pale brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Graycalm—rapid; Klacking—moderately rapid or rapid
Available water capacity: Low
Drainage class: Graycalm—somewhat excessively drained; Klacking—well drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Graycalm and similar soils: 40 to 60 percent
Klacking and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
- The excessively drained Grayling soils in landform positions similar to those of the Graycalm and Klacking soils
- The moderately well drained Perecheney soils in the lower landform positions

Similar inclusions:
- Soils that have a loamy substratum
- Soils that have a dark reddish brown or dark brown subsoil
- Soils that do not have bands of loamy sand in the substratum

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Graycalm—seedling mortality, equipment limitations; Klacking—seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate in areas of the Graycalm soil. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Graycalm—rapid permeability; Klacking—none
Management considerations:
- The poor filtering capacity of the Graycalm soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

Interpretive Groups

Land capability classification: Graycalm—4s; Klacking—3s
Woodland ordination symbol: 6S
Michigan soil management group: Graycalm—5a; Klacking—4a

475D—Graycalm-Klacking sands, 6 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on moraines and outwash plains
Shape of areas: Irregular and linear
Size of areas: 5 to 300 acres

Typical Profile

Graycalm

Surface layer:
0 to 2 inches—black sand

Subsoil:
2 to 27 inches—dark yellowish brown and yellowish brown sand
27 to 80 inches—brownish yellow sand with thin bands of strong brown and brown loamy sand

Klacking

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 3 inches—black sand

Subsoil:
3 to 25 inches—dark yellowish brown, brown, and yellowish brown sand
25 to 37 inches—light yellowish brown sand that has thin bands of reddish brown loamy sand
37 to 42 inches—light yellowish brown sand surrounding strong brown loamy sand and sandy loam
42 to 54 inches—brown and strong brown sandy loam surrounding light yellowish brown sand
54 to 68 inches—brown loamy sand that has bands of yellowish brown and very pale brown sand
68 to 80 inches—very pale brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Graycalm—rapid; Klacking—moderately rapid or rapid
Available water capacity: Low
Drainage class: Graycalm—somewhat excessively drained; Klacking—well drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight or moderate
Hazard of wind erosion: Severe

Composition

Graycalm and similar soils: 40 to 60 percent
Klacking and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The excessively drained Grayling soils in landform positions similar to those of the Graycalm and Klacking soils
• The moderately well drained Perecheney soils in the lower landform positions

Similar inclusions:
• Soils that have a loamy substratum
• Soils that have a dark reddish brown or dark brown subsoil
• Soils that do not have bands of loamy sand in the substratum

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Graycalm—seedling mortality, equipment limitations; Klacking—seedling mortality
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving, slope
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Graycalm—slope, rapid permeability; Klacking—slope
Management considerations:
• The poor filtering capacity of the Graycalm soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
• Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: Graycalm—6s; Klacking—4e
Woodland ordination symbol: 6S

Michigan soil management group: Graycalm—5a; Klacking—4a

475E—Graycalm-Klacking sands, 18 to 35 percent slopes

Setting

Landform: Escarpments, side slopes, and ridgetops on moraines and outwash plains
Shape of areas: Irregular and linear
Size of areas: 5 to 200 acres

Typical Profile

Graycalm

Surface layer:
0 to 2 inches—black sand

Subsoil:
2 to 27 inches—dark yellowish brown and yellowish brown sand
27 to 80 inches—brownish yellow sand that has thin bands of strong brown and brown loamy sand

Klacking

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 3 inches—black sand

Subsoil:
3 to 25 inches—dark yellowish brown, brown, and yellowish brown sand
25 to 37 inches—light yellowish brown sand that has thin bands of reddish brown loamy sand
37 to 42 inches—light yellowish brown sand surrounding strong brown loamy sand and sandy loam
42 to 54 inches—brown sandy loam surrounding light yellowish brown sand
54 to 68 inches—brown loamy sand that has bands of yellowish brown and very pale brown sand
68 to 80 inches—very pale brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Graycalm—rapid; Klacking—moderately rapid or rapid
Available water capacity: Low
Drainage class: Graycalm—somewhat excessively drained; Klacking—well drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Low
Flooding: None
Hazard of water erosion: Moderate or severe
Hazard of wind erosion: Severe

Composition

Graycalm and similar soils: 40 to 60 percent
Klacking and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
- The excessively drained Grayling and well drained Menominee soils in landform positions similar to those of the Graycalm and Klacking soils

Similar inclusions:
- Soils that have a loamy substratum
- Soils that have a dark reddish brown or dark brown subsoil
- Soils that do not have bands of loamy sand in the substratum

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Graycalm—seedling mortality, equipment limitations; Klacking—seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Graycalm—slope, rapid permeability; Klacking—slope
Management considerations:
- The poor filtering capacity of the Graycalm soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low,

uniform application rates help to minimize the risk of ground-water pollution.
• Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: Graycalm—7s; Klacking—7e
Woodland ordination symbol: 6R
Michigan soil management group: Graycalm—5a; Klacking—4a

476B—Klacking-Perecheney sands, 0 to 6 percent slopes

Setting

Landform: Flats and low knolls on moraines, outwash plains, and lake plains
Shape of areas: Irregular
Size of areas: 5 to 300 acres

Typical Profile

Klacking

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 3 inches—black sand

Subsoil:
3 to 25 inches—dark yellowish brown, brown, and yellowish brown sand
25 to 37 inches—light yellowish brown sand that has thin bands of reddish brown loamy sand
37 to 42 inches—light yellowish brown sand surrounding strong brown loamy sand and sandy loam
42 to 54 inches—brown sandy loam surrounding light yellowish brown sand
54 to 68 inches—brown loamy sand that has bands of yellowish brown and very pale brown sand
68 to 80 inches—very pale brown sand that has thin bands of brown loamy sand

Perecheney

Organic mat:
0 to 2 inches—dark brown, partially decomposed forest litter

Surface layer:
2 to 3 inches—black sand

Subsurface layer:
3 to 5 inches—grayish brown sand

Subsoil:
5 to 28 inches—strong brown sand
28 to 34 inches—brown, mottled loam surrounding light brownish gray loamy sand
34 to 46 inches—brown, mottled clay loam
46 to 71 inches—brown loam
71 to 80 inches—light yellowish brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Klacking—moderately rapid or rapid; Perecheney—rapid in the sandy part and moderately slow or moderate in the loamy part
Available water capacity: Klacking—low; Perecheney—moderate
Drainage class: Klacking—well drained; Perecheney—moderately well drained
Seasonal high water table: Klacking—at a depth of more than 6 feet; Perecheney—at a depth of 2.0 to 3.5 feet from November through May
Surface runoff class: Klacking—negligible; Perecheney—very low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Klacking and similar soils: 40 to 60 percent
Perecheney and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Morganlake and Kellogg soils in landform positions similar to or slightly lower than those of the Klacking and Perecheney soils
• The excessively drained Grayling and somewhat excessively drained Graycalm soils in landform positions similar to those of the Klacking and Perecheney soils

Similar inclusions:
• Soils that have less clay in the subsoil
• Soils that have clay below a depth of 60 inches
• Soils that have thinner layers of sand

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Klacking—seedling mortality, equipment limitations; Perecheney—seedling mortality

Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Klacking—none; Perecheney—restricted permeability
Management considerations:
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability of the Perecheney soil.

Interpretive Groups

Land capability classification: Klacking—3s; Perecheney—4s
Woodland ordination symbol: 6S
Michigan soil management group: Klacking—4a; Perecheney—4/2a

476D—Klacking-Perecheney sands, 6 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on moraines and outwash plains
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Klacking

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 3 inches—black sand

Subsoil:
3 to 25 inches—dark yellowish brown, brown, and yellowish brown sand
25 to 37 inches—light yellowish brown sand that has thin bands of reddish brown loamy sand
37 to 42 inches—light yellowish brown sand surrounding strong brown loamy sand and sandy loam
42 to 54 inches—brown and strong brown sandy loam surrounding light yellowish brown sand
54 to 68 inches—brown loamy sand that has bands of yellowish brown and very pale brown sand
68 to 80 inches—very pale brown sand that has thin bands of brown loamy sand

Perecheney

Organic mat:
0 to 2 inches—dark brown, partially decomposed forest litter

Surface layer:
2 to 3 inches—black sand

Subsurface layer:
3 to 5 inches—grayish brown sand

Subsoil:
5 to 28 inches—strong brown sand
28 to 34 inches—brown, mottled loam surrounding light brownish gray loamy sand
34 to 46 inches—brown, mottled clay loam
46 to 71 inches—brown loam
71 to 80 inches—light yellowish brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Klacking—moderately rapid or rapid; Perecheney—rapid in the sandy part and moderately slow or moderate in the loamy part
Available water capacity: Klacking—low; Perecheney—moderate
Drainage class: Klacking—well drained; Perecheney—moderately well drained
Seasonal high water table: Klacking—at a depth of more than 6 feet; Perecheney—at a depth of 2.0 to 3.5 feet from November through May
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight or moderate
Hazard of wind erosion: Severe

Composition

Klacking and similar soils: 40 to 60 percent
Perecheney and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The excessively drained Grayling and somewhat excessively drained Graycalm soils in landform positions similar to those of the Klacking and Perecheney soils

Similar inclusions:
- Soils that have less clay in the subsoil
- Soils that have clay below a depth of 60 inches
- Soils that have thinner layers of sand

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Klacking—seedling mortality, equipment limitations; Perecheney—seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Klacking—slope; Perecheney—slope, restricted permeability
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability of the Perecheney soil.
- Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: Klacking—4e; Perecheney—4s
Woodland ordination symbol: 6S
Michigan soil management group: Klacking—4a; Perecheney—4/2a

490—Urban land-Aquents, nearly level

Setting

Landform: Fill areas along shorelines on lake plains, outwash plains, and beach ridges
Shape of areas: Linear
Size of areas: 10 to 300 acres

Properties and Qualities of the Aquents

Texture: Sandy or loamy
Permeability: Variable
Available water capacity: Variable
Drainage class: Somewhat poorly drained to very poorly drained
Seasonal high water table: 1 foot above to 1.5 foot below the surface year round
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight to severe
Hazard of wind erosion: Severe

Composition

Urban land: 50 to 75 percent
Aquents: 25 to 50 percent
Contrasting inclusions: 0 to 15 percent

Contrasting Inclusions

- Soils that are well drained and moderately well drained

Use and Management

Land use: Building site development

Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Land capability classification: Urban land—none assigned; Aquents—6w
Woodland ordination symbol: None assigned
Michigan soil management group: None assigned

491A—Geels sand, 0 to 3 percent slopes

Setting

Landform: Low flats and swales on lake plains and outwash plains
Shape of areas: Irregular
Size of areas: 5 to 70 acres

Typical Profile

Surface layer:
0 to 2 inches—black sand

Subsoil:
2 to 29 inches—dark yellowish brown, yellowish brown, and brownish yellow sand
29 to 49 inches—light yellowish brown, mottled sand
49 to 71 inches—brown, mottled silty clay

Substratum:
71 to 80 inches—brown, mottled clay loam

Soil Properties and Qualities

Permeability: Rapid in the sandy part and slow in the clayey and loamy part
Available water capacity: Low
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.5 to 5.0 feet at some time from November through May
Surface runoff class: Low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Geels and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
- The moderately well drained Cublake soils in landform positions similar to those of the Geels soil
- The somewhat poorly drained Au Gres, Flink, and Finch soils in the lower landform positions
- The excessively drained Grayling soils in the higher landform positions
- The very poorly drained Deford and Kinross soils in the lower landform positions

Similar inclusions:
- Soils that have bands of sand below a depth of 60 inches
- Soils that have a dark reddish brown or dark brown subsoil
- Soils that have fine sand and silt below a depth of 60 inches

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality, plant competition, windthrow hazard, seasonal droughtiness
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting when the soil is moist can reduce the seedling mortality rate.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- Carefully managed reforestation helps to control undesirable understory plants.
- Special harvest methods may be needed to control undesirable plants.

Building site development

Major management concerns: Cutbanks caving, wetness, shrinking and swelling
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Rapid permeability, seasonal wetness, restricted permeability
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
- Filling or mounding with suitable fill material helps to raise the absorption field above the water table.
- Backfilling the trenches with porous material helps to compensate for the restricted permeability.

Interpretive Groups

Land capability classification: 4s
Woodland ordination symbol: 3S
Michigan soil management group: 5/1a

492A—Allendale sand, 0 to 3 percent slopes, sandy substratum

Setting

Landform: Low flats and swales on outwash plains and collapsed lake plains
Shape of areas: Irregular
Size of areas: 3 to 100 acres

Typical Profile

Organic mat:
0 to 3 inches—black, partially decomposed forest litter

Surface layer:
3 to 6 inches—brown sand

Subsurface layer:
6 to 8 inches—light brownish gray sand

Subsoil:
8 to 31 inches—dark reddish brown, dark brown, strong brown, and yellowish brown, mottled sand
31 to 37 inches—light yellowish brown, mottled sand surrounding reddish brown, mottled sandy loam and loamy sand
37 to 58 inches—dark brown, mottled clay
58 to 76 inches—brown, mottled clay loam

Substratum:
76 to 80 inches—brown, mottled sand

Soil Properties and Qualities

Permeability: Rapid in the upper sandy part, very slow or slow in the clayey part, and rapid in the lower sandy part
Available water capacity: Low
Drainage class: Somewhat poorly drained
Seasonal high water table: At a depth of 0.5 foot to 1.5 feet at some time from November through May
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Allendale and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
- The moderately well drained Kellogg soils in the slightly higher landform positions
- The poorly drained and very poorly drained Wakeley and Tawas soils in the lower landform positions

Similar inclusions:
- Soils that have more silt in the subsoil
- Soils that have thin bands of sand in the subsoil or substratum
- Soils that have clay below a depth of 70 inches

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality, plant competition, windthrow hazard
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings when the soil is moist and planting special nursery stock can reduce the seedling mortality rate. Replanting may be needed in some areas.
- After trees are harvested, plant competition from unwanted species may delay the establishment of desired species.
- Competing vegetation can be controlled by mechanical or chemical means.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.

Building site development

Major management concerns: Cutbanks caving, wetness, shrinking and swelling
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
- Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Wetness, restricted permeability
Management considerations:
- Filling or mounding with suitable fill material helps to raise the absorption field above the water table and increases the thickness of the filtering material.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

Interpretive Groups

Land capability classification: 4w

Woodland ordination symbol: 4W
Michigan soil management group: 4/1b

493A—Otisco sand, 0 to 3 percent slopes

Setting

Landform: Low flats and swales on outwash plains and lake plains
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Organic mat:
0 to 1 inch—reddish black, partially decomposed forest litter

Surface layer:
1 to 3 inches—black sand

Subsurface layer:
3 to 12 inches—light grayish brown sand

Subsoil:
12 to 27 inches—dark reddish brown, yellowish brown, and light yellowish brown, mottled sand
27 to 36 inches—light yellowish brown, mottled sand surrounding brown, mottled loamy sand
36 to 55 inches—yellowish brown, mottled sandy loam and loamy sand surrounding light gray, mottled sand

Substratum:
55 to 80 inches—brown, mottled sand

Soil Properties and Qualities

Permeability: Moderately rapid or rapid
Available water capacity: Low
Drainage class: Somewhat poorly drained
Seasonal high water table: At a depth of 0.5 foot to 1.5 feet from November through May
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Otisco and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Au Gres soils in landform positions similar to those of the Otisco soil
• The moderately well drained Chinwhisker and Croswell soils in the higher landform positions
• The very poorly drained Deford soils in the lower landform positions

Similar inclusions:
• Soils that have a surface layer of loamy sand
• Soils that have thin layers of loamy material
• Soils that do not have a dark reddish brown or dark brown subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
• The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• Special harvest methods may be needed to control undesirable plants.
• If trees are planted, site preparation is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Cutbanks caving, wetness
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields

Major management concerns: Wetness, rapid permeability
Management considerations:
• Mounding or adding suitable fill material helps to raise the absorption field above the water table.
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

Interpretive Groups

Land capability classification: 3w
Woodland ordination symbol: 4W
Michigan soil management group: 4b

495B—Gerrish sand, 0 to 6 percent slopes

Setting

Landform: Flats and knolls on kame moraines and outwash plains
Shape of areas: Irregular
Size of areas: 3 to 300 acres

Typical Profile

Surface layer:
0 to 1 inch—black sand

Subsurface layer:
1 to 3 inches—brown sand

Subsoil:
3 to 10 inches—strong brown gravelly sand
10 to 26 inches—light yellowish brown and yellowish brown very gravelly sand
26 to 80 inches—light yellowish brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Rapid or very rapid
Available water capacity: Low
Drainage class: Somewhat excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Gerrish and similar soils: 85 to 90 percent
Contrasting inclusions: 10 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Klacking and excessively drained Grayling soils in landform positions similar to those of the Gerrish soil
• The moderately well drained Perecheney soils in the lower landform positions

Similar inclusions:
• Soils that do not have bands of loamy sand in the substratum
• Soils that have a substratum of gravelly sand
• Soils that have more than 40 percent gravel and cobbles in the subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Cutbanks caving
Management considerations:
• Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Poor filtering capacity
Management considerations:
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

Interpretive Groups

Land capability classification: 4s
Woodland ordination symbol: 4S
Michigan soil management group: 5a

495D—Gerrish sand, 6 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on kame moraines
Shape of areas: Irregular and linear
Size of areas: 3 to 100 acres

Typical Profile

Surface layer:
0 to 1 inch—black sand

Subsurface layer:
1 to 3 inches—brown sand

Subsoil:
3 to 10 inches—strong brown gravelly sand
10 to 26 inches—light yellowish brown and yellowish brown very gravelly sand
26 to 80 inches—light yellowish brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Rapid or very rapid
Available water capacity: Low
Drainage class: Somewhat excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight or moderate
Hazard of wind erosion: Severe

Composition

Gerrish and similar soils: 85 to 90 percent
Contrasting inclusions: 10 to 15 percent

Inclusions

Contrasting inclusions:
- The well drained Klacking and excessively drained Grayling soils in landform positions similar to those of the Gerrish soil

Similar inclusions:
- Soils that do not have bands of loamy sand in the substratum
- Soils that have a substratum of gravelly sand
- Soils that have more than 40 percent gravel and cobbles in the subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting when the soil is moist can reduce the seedling mortality rate.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
- Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: 6s
Woodland ordination symbol: 4R
Michigan soil management group: 5a

495F—Gerrish sand, 18 to 45 percent slopes

Setting

Landform: Escarpments, side slopes, and ridgetops on kame moraines
Shape of areas: Irregular and linear
Size of areas: 3 to 60 acres

Typical Profile

Surface layer:
0 to 1 inch—black sand

Subsurface layer:
1 to 3 inches—brown sand

Subsoil:
3 to 10 inches—strong brown gravelly sand
10 to 26 inches—light yellowish brown and yellowish brown very gravelly sand
26 to 80 inches—light yellowish brown sand that has thin bands of brown loamy sand

Soil Properties and Qualities

Permeability: Rapid or very rapid

Available water capacity: Low
Drainage class: Somewhat excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Low
Flooding: None
Hazard of water erosion: Moderate or severe
Hazard of wind erosion: Severe

Composition

Gerrish and similar soils: 85 to 90 percent
Contrasting inclusions: 10 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Klacking and excessively drained Grayling soils in landform positions similar to those of the Gerrish soil

Similar inclusions:
• Soils that do not have bands of loamy sand in the substratum
• Soils that have a substratum of gravelly sand
• Soils that have more than 40 percent gravel and cobbles in the subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
• Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
• Small areas of nearly level included soils, if any are available, and suitable nearly level adjacent areas should be selected as sites for landings.
• The risk of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
• The use of mechanical planters is limited by the slope. Hand planting of seedlings may be desirable.
• Planting when the soil is moist can reduce the seedling mortality rate.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Slope
Management considerations:
• Because of the slope, this soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Slope
Management considerations:
• Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: 7s
Woodland ordination symbol: 4R
Michigan soil management group: 5a

496B—Gerrish-Grayling sands, 0 to 6 percent slopes

Setting

Landform: Flats and knolls on outwash plains and kame moraines
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Typical Profile

Gerrish

Surface layer:
0 to 1 inch—black sand

Subsurface layer:
1 to 3 inches—brown sand

Subsoil:
3 to 10 inches—strong brown gravelly sand
10 to 26 inches—light yellowish brown and yellowish brown very gravelly sand
26 to 80 inches—light yellowish brown sand that has thin bands of brown loamy sand

Grayling

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 3 inches—very dark brown sand

Subsurface layer:
3 to 4 inches—brown sand

Subsoil:
4 to 30 inches—dark yellowish brown, yellowish brown, and brownish yellow sand

Substratum:
30 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Gerrish—rapid or very rapid; Grayling—rapid
Available water capacity: Low
Drainage class: Gerrish—somewhat excessively drained; Grayling—excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Gerrish and similar soils: 40 to 60 percent
Grayling and similar soils: 35 to 45 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Klacking and somewhat excessively drained Graycalm soils in landform positions similar to those of the Gerrish and Grayling soils
• The moderately well drained Perecheney soils in the lower landform positions

Similar inclusions:
• Soils that have a dark reddish brown or dark brown subsoil
• Soils that have gravel in the substratum
• Soils that do not have bands of loamy sand in the substratum
• Soils that have more than 40 percent gravel and cobbles in the subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality
Management considerations:
• Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
• Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Rapid permeability
Management considerations:
• The poor filtering capacity of these soils can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

Interpretive Groups

Land capability classification: Gerrish—4s; Grayling—6s
Woodland ordination symbol: 4S
Michigan soil management group: Gerrish—5a; Grayling—5.7c

496D—Gerrish-Grayling sands, 6 to 18 percent slopes

Setting

Landform: Knolls, side slopes, and low ridges on kame moraines and outwash plains
Shape of areas: Irregular and linear
Size of areas: 10 to 200 acres

Typical Profile

Gerrish

Surface layer:
0 to 1 inch—black sand

Subsurface layer:
1 to 3 inches—brown sand

Subsoil:
3 to 10 inches—strong brown gravelly sand
10 to 26 inches—light yellowish brown and yellowish brown very gravelly sand
26 to 80 inches—light yellowish brown sand that has thin bands of brown loamy sand

Grayling

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 3 inches—very dark brown sand

Subsurface layer:
3 to 4 inches—brown sand

Subsoil:
4 to 30 inches—dark yellowish brown, yellowish brown, and brownish yellow sand

Substratum:
30 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Gerrish—rapid or very rapid; Grayling—rapid
Available water capacity: Low
Drainage class: Graycalm—somewhat excessively drained; Grayling—excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight or moderate
Hazard of wind erosion: Severe

Composition

Gerrish and similar soils: 45 to 65 percent
Grayling and similar soils: 30 to 40 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
- The well drained Klacking and somewhat excessively drained Graycalm soils in landform positions similar to those of the Gerrish and Grayling soils
- The moderately well drained Perecheney soils in the lower landform positions

Similar inclusions:
- Soils that have a dark reddish brown or dark brown subsoil
- Soils that have gravel in the substratum
- Soils that do not have bands of loamy sand in the substratum
- Soils that have more than 40 percent gravel and cobbles in the subsoil

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings that can withstand droughty conditions can reduce the seedling mortality rate. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Rapid permeability, slope
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.
- Land shaping and installing the distribution lines on the contour can help to overcome the slope.

Interpretive Groups

Land capability classification: Gerrish—6s; Grayling—7s
Woodland ordination symbol: Gerrish—4R; Grayling—4S
Michigan soil management group: Gerrish—5a; Grayling—5.7c

496F—Gerrish-Grayling sands, 18 to 45 percent slopes

Setting

Landform: Escarpments, side slopes, and ridgetops on kame moraines and outwash plains
Shape of areas: Irregular and linear
Size of areas: 5 to 100 acres

Typical Profile

Gerrish

Surface layer:
0 to 1 inch—black sand

Subsurface layer:
1 to 3 inches—brown sand

Subsoil:
3 to 10 inches—strong brown gravelly sand
10 to 26 inches—light yellowish brown and yellowish brown very gravelly sand
26 to 80 inches—light yellowish brown sand that has thin bands of brown loamy sand

Grayling

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 3 inches—very dark brown sand

Subsurface layer:
3 to 4 inches—brown sand

Subsoil:
4 to 30 inches—dark yellowish brown, yellowish brown, and brownish yellow sand

Substratum:
30 to 80 inches—light yellowish brown sand

Soil Properties and Qualities

Permeability: Gerrish—rapid or very rapid; Grayling—rapid
Available water capacity: Low
Drainage class: Graycalm—somewhat excessively drained; Grayling—excessively drained
Seasonal high water table: At a depth of more than 6 feet
Surface runoff class: Low
Flooding: None
Hazard of water erosion: Moderate or severe
Hazard of wind erosion: Severe

Composition

Gerrish and similar soils: 40 to 75 percent
Grayling and similar soils: 20 to 45 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Klacking and excessively drained Graycalm soils in landform positions similar to those of the Gerrish and Grayling soils

Similar inclusions:
• Soils that have a dark reddish brown or dark brown subsoil
• Soils that have gravel in the substratum
• Soils that do not have bands of loamy sand in the substratum
• Soils that have more than 40 percent gravel and cobbles in the subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
• Because of the erosion hazard, water should be removed from logging roads by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
• Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
• Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
• Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Planting when the soil is moist can reduce the seedling mortality rate.

Building site development

Major management concerns: Slope, cutbanks caving
Management considerations:
• Because of the slope, these soils are generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Slope, rapid permeability
Management considerations:
• Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

Interpretive Groups

Land capability classification: Gerrish—7s; Grayling—7s
Woodland ordination symbol: 4R
Michigan soil management group: Gerrish—5a; Grayling—5.7c

497A—Debolt sandy loam, 0 to 3 percent slopes

Setting

Landform: Low flats on collapsed lake plains
Shape of areas: Irregular
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 3 inches—very dark grayish brown sandy loam

Subsurface layer:
3 to 7 inches—grayish brown and pinkish gray sandy loam

Subsoil:
7 to 10 inches—brown silty clay surrounding grayish brown sandy loam
10 to 28 inches—brown silty clay and silty clay loam
28 to 33 inches—strong brown, mottled clay loam

Substratum:
33 to 65 inches—yellowish brown and light yellowish brown sand
65 to 80 inches—brown and pale brown, mottled sand and loamy sand

Soil Properties and Qualities

Permeability: Moderately slow to moderately rapid in the clayey and loamy part and rapid in the sandy part
Available water capacity: Moderate
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2.5 to 3.5 feet at some time from October through May
Surface runoff class: High
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Debolt and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The well drained Perecheney soils in the slightly higher landform positions
• The moderately well drained Pinewood soils in landform positions similar to or slightly lower than those of the Debolt soil
• The somewhat poorly drained Kellogg soils in the slightly lower landform positions
• The very poorly drained Wakeley soils in the lower landform positions

Similar inclusions:
• Soils that have more clay in the subsoil
• Soils that have a surface layer of loam
• Soils that have less clay in the subsoil
• Soils that have no mottles in the subsoil

Use and Management

Land use: Dominant uses—pasture, idle land; other uses—forestland, cropland, building site development

Cropland

Major management concerns: Water erosion, wetness, nutrient loss
Management considerations:
• A system of conservation tillage that leaves crop residue on the surface helps to control water erosion, helps to prevent crusting during periods of heavy rainfall, and increases the rate of water infiltration.
• Conservation tillage, crop residue management, windbreaks, and cover crops help to control wind erosion.
• Subsurface drains can reduce the wetness if a suitable outlet is available.
• Timing fertilizer applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands can reduce the risk of nutrient loss.

Pasture

Major management concerns: Wetness, soil compaction
Management considerations:
• Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.
• Basing applications of lime and fertilizer on the results of soil tests helps to ensure maximum growth of plants, especially legumes.

Forestland

Major management concerns: Equipment limitations, plant competition
Management considerations:
• Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
• After cutting, competition from brush can delay or prevent the natural regeneration of desired species.
• Special harvest methods may be needed to control undesirable plants.

Building site development

Major management concerns: Wetness, shrinking and swelling
Management considerations:
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Wetness, restricted permeability
Management considerations:
• Mounding or adding suitable fill material helps to raise the absorption field above the water table.
• Backfilling the trenches with porous material helps to compensate for the restricted permeability.
• Enlarging the absorption area helps to compensate for the restricted permeability.

Interpretive Groups

Land capability classification: 2e
Woodland ordination symbol: 3L
Michigan soil management group: 2.5a

498A—Pinewood sandy loam, 0 to 2 percent slopes

Setting

Landform: Low flats and swales on collapsed lake plains
Shape of areas: Irregular
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 8 inches—very dark grayish brown sandy loam

Subsoil:
8 to 14 inches—brown, mottled clay surrounded by light grayish brown sandy loam
14 to 26 inches—brown, mottled clay
26 to 45 inches—brown, mottled silty clay

Substratum:
45 to 58 inches—strong brown, mottled sand
58 to 80 inches—yellowish brown sand

Soil Properties and Qualities

Permeability: Slow to moderate in the loamy part and rapid in the sandy part
Available water capacity: Moderate
Drainage class: Somewhat poorly drained
Seasonal high water table: At a depth of 1 to 2 feet at some time from November through April
Surface runoff class: High
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Slight

Composition

Pinewood and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
• The moderately well drained Debolt, Perecheney, and Kellogg soils in landform positions similar to or slightly higher than those of the Pinewood soil
• The very poorly drained Wakeley soils in the lower landform positions

Similar inclusions:
• Soils that have more clay in the subsoil
• Soils that have a surface layer of loam
• Soils that have a sandy substratum at a depth of 20 to 40 inches

Use and Management

Land use: Dominant uses—idle land, forestland; other uses—pasture, cropland, building site development

Cropland

Major management concerns: Water erosion, wetness, nutrient loss
Management considerations:
• A system of conservation tillage that leaves crop residue on the surface helps to control water erosion, helps to prevent crusting during periods of heavy rainfall, and increases the rate of water infiltration.
• Conservation tillage, crop residue management, windbreaks, and cover crops help to control wind erosion.
• Subsurface drains can reduce the wetness if a suitable outlet is available.
• Timing fertilizer applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands can reduce the risk of nutrient loss.

Pasture

Major management concerns: Wetness, soil compaction
Management considerations:
• Proper stocking rates, pasture rotation, timely

deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.
• Basing applications of lime and fertilizer on the results of soil tests helps to ensure maximum growth of plants, especially legumes.

Forestland

Major management concerns: Equipment limitations, plant competition
Management considerations:
• Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
• After cutting, competition from brush can delay or prevent the natural regeneration of desired species.
• Special harvest methods may be needed to control undesirable plants.

Building site development

Major management concerns: Wetness, shrinking and swelling
Management considerations:
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Wetness, restricted permeability
Management considerations:
• Mounding or adding suitable fill material helps to raise the absorption field above the water table.
• Backfilling the trenches with porous material helps to compensate for the restricted permeability.
• Enlarging the absorption area helps to compensate for the restricted permeability.

Interpretive Groups

Land capability classification: 2w
Woodland ordination symbol: 2W
Michigan soil management group: 1.5b

499—Dawson-Kinross complex

Setting

Landform: Low flats, swales, and depressions on lake plains, outwash plains, and ground moraines
Shape of areas: Irregular and linear
Size of areas: 5 to 70 acres

Typical Profile

Dawson

Surface layer:
0 to 5 inches—light yellowish brown peat

Subsoil:
5 to 19 inches—black muck

Substratum:
19 to 80 inches—dark gray, dark brown, dark yellowish brown, and yellowish brown sand

Kinross

Organic mat:
0 to 1 inch—black, undecomposed forest litter

Surface layer:
1 to 6 inches—black muck

Subsoil:
6 to 13 inches—grayish brown sand
13 to 28 inches—dark brown and brown, mottled sand
28 to 45 inches—dark yellowish brown sand

Substratum:
45 to 80 inches—brown sand

Soil Properties and Qualities

Permeability: Dawson—moderately slow in the organic part and rapid in the sandy part; Kinross—rapid
Available water capacity: Dawson—very high; Kinross—low
Drainage class: Very poorly drained
Seasonal high water table: Dawson—1 foot above to 1 foot below the surface from September through June; Kinross—1 foot above to 1 foot below the surface from October through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Moderate

Composition

Dawson and similar soils: 35 to 60 percent
Kinross and similar soils: 30 to 50 percent
Contrasting inclusions: 10 to 15 percent

Inclusions

Contrasting inclusions:
• The very poorly drained Deford and Leafriver soils in landform positions similar to those of the Dawson and Kinross soils
• The somewhat poorly drained Au Gres and Finch

soils in landform positions similar to or slightly higher than those of the Dawson and Kinross soils

Similar inclusions:
- Soils that have a cemented subsoil
- Soils that have a seasonal high water table at a depth of 1 to 2 feet
- Soils that have a loamy substratum
- Soils that are more alkaline throughout

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Cutbanks caving, wetness, frost action
Management considerations:
- Because of ponding, these soils are generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Ponding, rapid permeability
Management considerations:
- Because of ponding, these soils are generally unsuited to use as sites for septic tank absorption fields.

Interpretive Groups

Land capability classification: Dawson—7w; Kinross—6w
Woodland ordination symbol: 2W
Michigan soil management group: Dawson—Mc-a; Kinross—5c-a

500A—Flink sand, 0 to 3 percent slopes

Setting

Landform: Low flats and swales on lake plains and outwash plains
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter

Surface layer:
2 to 7 inches—pinkish gray sand

Subsoil:
7 to 10 inches—dark brown sand
10 to 43 inches—brown, strong brown, and brownish yellow, mottled sand

Substratum:
43 to 55 inches—light yellowish brown sand
55 to 60 inches—brown, mottled loam
60 to 80 inches—brown, mottled, stratified loam and clay loam

Soil Properties and Qualities

Permeability: Rapid in the sandy part and moderately slow in the stratified loamy part
Available water capacity: Low
Drainage class: Somewhat poorly drained
Seasonal high water table: At a depth of 0.5 foot to 1.5 feet from November through May
Surface runoff class: Negligible
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Flink and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Inclusions

Contrasting inclusions:
- The moderately well drained Kellogg soils in the slightly higher landform positions
- The somewhat poorly drained Finch, Au Gres, and Cublake soils in landform positions similar to those of the Flink soil
- The poorly drained and very poorly drained Kinross and Wakeley soils in the lower landform positions

Similar inclusions:
- Soils that have more or less clay in the substratum

• Soils that do not have a dark reddish brown or dark brown subsoil

Use and Management

Land use: Dominant use—forestland

Forestland

Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
• The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• Special harvest methods may be needed to control undesirable plants.
• If trees are planted, site preparation is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Cutbanks caving, wetness, frost action
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by frost action.

Septic tank absorption fields

Major management concerns: Wetness, rapid permeability
Management considerations:
• Mounding or adding suitable fill material helps to raise the absorption field above the water table.
• The poor filtering capacity of this soil can result in the pollution of ground water. On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

Interpretive Groups

Land capability classification: 4w
Woodland ordination symbol: 6W
Michigan soil management group: 5b

501B—Kellogg sand, 0 to 6 percent slopes, sandy substratum

Setting

Landform: Flats and low knolls on lake plains
Shape of areas: Irregular
Size of areas: 3 to 200 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 3 inches—black sand

Subsurface layer:
3 to 7 inches—brown sand

Subsoil:
7 to 19 inches—brown and strong brown sand
19 to 32 inches—yellowish brown, mottled coarse sand
32 to 38 inches—brown, mottled clay loam surrounding grayish brown loamy sand
38 to 65 inches—brown, mottled clay

Substratum:
65 to 70 inches—brown, mottled loamy very fine sand
70 to 80 inches—light yellowish brown, mottled very fine sand

Soil Properties and Qualities

Permeability: Rapid in the sandy upper part, slow in the clayey and loamy part, and rapid in the sandy lower part
Available water capacity: Low
Drainage class: Moderately well drained
Seasonal high water table: At a depth of 2 to 5 feet at some time from October through May
Surface runoff class: Very low
Flooding: None
Hazard of water erosion: Slight
Hazard of wind erosion: Severe

Composition

Kellogg and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Inclusions

Contrasting inclusions:
- The well drained Klacking and somewhat excessively drained Graycalm soils in the slightly higher landform positions
- The somewhat poorly drained Allendale, Pinewood, and Flink soils in landform positions similar to or slightly lower than those of the Kellogg soil

Similar inclusions:
- Soils that have less clay in the subsoil
- Soils that have a dark reddish brown or dark brown subsoil
- Soils that have clay below a depth of 60 inches
- Soils that have mottles below a depth of 48 inches
- Soils that have carbonates at a depth of 37 to 60 inches

Use and Management

Land use: Dominant use—forestland; other uses—building site development

Forestland

Major management concerns: Equipment limitations, seedling mortality, plant competition
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings when the soil is moist and planting special nursery stock can reduce the seedling mortality rate. Replanting may be needed in some areas.
- After trees are harvested, plant competition from unwanted species may delay the establishment of desired species.
- Competing vegetation can be controlled by mechanical or chemical means.

Building site development

Major management concerns: Cutbanks caving, wetness, shrinking and swelling
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
- Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Major management concerns: Wetness, restricted permeability
Management considerations:
- Filling or mounding with suitable fill material helps to raise the absorption field above the water table and increases the thickness of the filtering material.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

Interpretive Groups

Land capability classification: 3s
Woodland ordination symbol: 3S
Michigan soil management group: 4/1a

502B—Kawkawlin-Sims loams, 0 to 4 percent slopes

Setting

Landform: Flats and low knolls on ground moraines and end moraines
Shape of areas: Irregular
Size of areas: 5 to 70 acres

Typical Profile

Kawkawlin

Surface layer:
0 to 3 inches—very dark gray loam

Subsurface layer:
3 to 5 inches—light brownish gray loam

Subsoil:
5 to 9 inches—brown clay loam surrounded by light brownish gray clay loam
9 to 32 inches—dark yellowish brown, brown, and yellowish brown, mottled clay loam

Substratum:
32 to 80 inches—brown, mottled clay loam

Sims

Surface layer:
0 to 9 inches—very dark gray loam

Subsoil:
9 to 51 inches—brown, grayish brown, and light brownish gray, mottled clay loam

Substratum:
51 to 80 inches—light gray, mottled clay loam

Soil Properties and Qualities

Permeability: Slow
Available water capacity: High
Drainage class: Kawkawlin—somewhat poorly drained; Sims—very poorly drained

Seasonal high water table: Kawkawlin—at a depth of 1 to 2 feet at some time from October through May; Sims—1 foot above to 1 foot below the surface at some time from November through May
Surface runoff class: High
Flooding: None
Hazard of water erosion: Kawkawlin—slight or moderate; Sims—slight
Hazard of wind erosion: Slight

Composition

Kawkawlin and similar soils: 45 to 60 percent
Sims and similar soils: 40 to 50 percent
Contrasting inclusions: 0 to 10 percent

Inclusions

Contrasting inclusions:
- The moderately well drained Nester soils in the higher landform positions
- The very poorly drained Wakeley soils in landform positions similar to those of the Kawkawlin and Sims soils

Similar inclusions:
- Soils that have a surface layer of sandy loam
- Soils that have less clay throughout
- Soils that have more silt in the subsoil

Use and Management

Land use: Dominant use—forestland; other uses—pasture

Forestland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition, wetness
Management considerations:
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Carefully managed reforestation helps to control undesirable understory plants.
- Special harvest methods may be needed to control undesirable plants.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- Trees that can withstand seasonal wetness should be selected for planting on the Sims soil.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Sims soil.

Building site development

Major management concerns: Kawkawlin—wetness, shrinking and swelling; Sims—wetness, shrinking and swelling, ponding
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
- Because of ponding, the Sims soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Kawkawlin—restricted permeability, wetness; Sims—restricted permeability, wetness, ponding
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Because of ponding and the restricted permeability, the Sims soil is generally unsuited to use as a site for septic tank absorption fields.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability of the Kawkawlin soil.

Interpretive Groups

Land capability classification: Kawkawlin—2e; Sims—5w
Woodland ordination symbol: Kawkawlin—3W; Sims—4W
Michigan soil management group: Kawkawlin—1.5b; Sims—1.5c

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 5,775 acres in the survey area, or less than 2 percent of the total acreage, meets the soil requirements for prime farmland. Most of the prime farmland is used for hay or is idle land.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Hydric Soils

In this section, hydric soils are defined and described and the hydric soils in the survey area are listed.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 1995). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in “Soil Taxonomy” (Soil Survey Staff, 1999) and “Keys to Soil Taxonomy” (Soil Survey Staff, 1998) and in the “Soil Survey Manual” (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in “Field Indicators of Hydric Soils in the United States” (Hurt and others, 1998).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

This survey can be used to locate probable areas of hydric soils.

The following map units meet the definition of hydric soils and, in addition, have at least one of the hydric soil indicators. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 1998).

13	Tawas-Lupton mucks
14	Dawson-Loxley peats
23	Ausable-Bowstring mucks, frequently flooded
24A	Kinross-Au Gres complex, 0 to 3 percent slopes
35	Kinross muck
50B	Au Gres-Kinross-Croswell complex, 0 to 6 percent slopes
51	Tawas-Leafriver mucks
58A	Wakeley-Allendale complex, 0 to 3 percent slopes
67A	Bowers-Deerheart complex, 0 to 3 percent slopes
86	Histosols and Aquents, ponded
87	Ausable muck, frequently flooded
360	Wakeley muck
368A	Au Gres-Deford complex, 0 to 3 percent slopes
369	Deford muck
408	Sims loam

- 410B Proper-Finch-Deford complex, 0 to 6 percent slopes
- 473 Deford-Kinross mucks
- 474 Histosols-Fluvaquents complex, frequently flooded
- 490 Urban land-Aquents, nearly level
- 499 Dawson-Kinross complex
- 502B Kawkawlin-Sims loams, 0 to 4 percent slopes

Map units that are made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The following map units, in general, do not meet the definition of hydric soils because they do not have one of the hydric soil indicators. A portion of these map units, however, may include hydric soils. Onsite investigation is recommended to determine whether hydric soils occur and the location of the included hydric soils.

- 15A Croswell-Au Gres sands, 0 to 3 percent slopes
- 17A Croswell sand, 0 to 3 percent slopes
- 18A Au Gres sand, 0 to 3 percent slopes
- 26B Cublake sand, 0 to 6 percent slopes
- 57B Kawkawlin loam, 1 to 4 percent slopes
- 103B Nester sandy loam, 1 to 6 percent slopes
- 103C Nester sandy loam, 6 to 12 percent slopes
- 114A Ingalls sand, 0 to 3 percent slopes
- 159A Finch sand, 0 to 3 percent slopes
- 380 Access denied
- 382B Proper sand, 0 to 6 percent slopes
- 491A Geels sand, 0 to 3 percent slopes
- 492A Allendale sand, 0 to 3 percent slopes, sandy substratum
- 493A Otisco sand, 0 to 3 percent slopes
- 497A Debolt sandy loam, 0 to 3 percent slopes
- 498A Pinewood sandy loam, 0 to 2 percent slopes
- 500A Flink sand, 0 to 3 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Jacque S. Korn, resource conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Approximately 4,140 acres in Roscommon County, or 1.2 percent of the total acreage, is farmland. About 2,100 acres is used as cropland, and 1,390 acres is pasture. Farming is limited in Roscommon County by the short growing season and because most of the soils are generally unsuitable for growing crops.

Most crop rotations consist of small grain and several years of hay and pasture. Oats are the most common grain crops. Other grains, such as wheat, rye, barley, and corn, are not commonly grown. Hay crops typically consist of grasses mixed with a legume, such as alfalfa, birdsfoot trefoil, or red clover. Grasses grown for hay and pasture are mainly orchardgrass and bromegrass.

Soil drainage is a major management need in many areas of farmland in Roscommon County. Most of the somewhat poorly drained and poorly drained soils cannot be drained economically. Such soils are in low-lying areas on plains and in depressions, where ponding is frequent and suitable drainage outlets are not readily available. These soils are also subject to low soil temperature, which hinders seed germination and extends periods of frost.

Excessive drainage in other soils leads to droughty conditions, reduction in crop yields, or crop loss. Supplemental irrigation can increase yields and can also be used to protect crops from frost damage. Soil moisture can be conserved by using a system of conservation tillage that leaves crop residue on the surface. Increasing the content of organic matter can improve the available water capacity.

Water erosion is a concern on some of the soils used for crops and pasture in Roscommon County. The original surface layer of the soil can be carried

away in runoff if the soil is left exposed by tillage or other farming operations. Loss of the surface soil can result in reduced productivity. Because the subsoil has a lower content of organic matter than the original surface soil, the available water capacity also is lower and soil tilth is poorer. In some soils, the subsoil has a higher content of clay than that of the surface soil. If this clayey subsoil is exposed by erosion, the result is a plow layer that remains wet for a relatively long period after rainfall. Field operations may be delayed. The clayey plow layer resulting from water erosion also tends to be cloddy and makes a poor seedbed. Surface crusting is common, and plant emergence can be difficult.

Erosion results in the sedimentation of streams, lakes, and wetlands. The sediment can carry fertilizer and pesticides, which reduce the quality of water for both public and private use.

A number of conservation practices can be used to control water erosion. A system of conservation tillage that leaves crop residue on the surface increases the rate of water infiltration and reduces the runoff rate and the hazard of erosion. Stripcropping utilizes narrow fields of grass or a close-growing crop alternated with strips of a clean-tilled crop or fallow. Permanent hay or pasture, if managed properly, can provide a very effective protective cover. Grassed waterways and grade-stabilization structures can be used to control erosion caused by concentrated flow runoff.

Wind erosion is a hazard in many areas of Roscommon County where the soils are not protected by vegetation or windbreaks. Soils that have a surface layer of sand, sandy loam, or loamy sand are especially susceptible to wind erosion. Also, soils that have lost the original surface layer are generally susceptible to wind erosion.

Conservation practices that leave crop residue on the surface help to control wind erosion. Other practices include stripcropping, vegetative barriers, tree or shrub windbreaks, and permanent hay or pasture.

Soil fertility is naturally low in the sandy soils in the county and is medium in most of the loamy soils. Soil fertility can be quite variable as a result of previous land use and management. Most of the soils used for farmland range from moderately acid to neutral in the surface layer. Additions of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on the expected yields. The Michigan State University Extension Service can recommend the kind and amount of fertilizer and lime to apply.

Soil tilth is an important factor in the germination of seeds and in the workability of the soil. Soils that have good tilth are those that have good granular structure and have a moderate or high content of organic matter.

The use of machinery when the soils are wet can result in compaction and surface crusting. Soil compaction and surface crusting reduce the rate of water infiltration and increase the runoff rate. Soil compaction and the loss of good granular structure result in the formation of small individual soil particles. These small particles are easily carried away by wind and water.

Preparing a good seedbed in severely eroded areas is difficult because of the low moisture content of the soils and the hazard of surface crusting. Because of the susceptibility to excessive erosion in these areas, fall plowing is not recommended. Timely fieldwork, adequate surface and subsurface drainage, and practices that help to maintain the content of organic matter improve soil structure and tilth, minimize soil compaction, and reduce the hazard of erosion.

Much of the permanent pasture in Roscommon County is in areas of wet soils. If grazing is allowed when the soils are wet, surface compaction can reduce the growth of forage plants. Some of the pasture is in areas that are susceptible to erosion. Control of erosion is particularly important during pasture reseeding.

The productivity of a pasture and its ability to protect the surface of the soil are influenced by the number of livestock the pasture supports, the length of time the livestock graze, and precipitation or supplemental irrigation. Good pasture management includes applying proper stocking rates, which help to maintain key forage plants; using a system of pasture rotation or deferred grazing; harvesting excess forage; and supplying livestock water at strategic locations.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension

agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forestland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity.

The capability classification of map units in this survey area is given in the section “Detailed Soil Map Units” and in the yields table.

Forestland Management and Productivity

Ken Phillips, assistant area forester, Michigan Department of Natural Resources, helped prepare this section.

Nearly 56 percent of the forestland in the county, or about 192,000 acres, is managed by the State or Federal government. The majority of the forestland is dominated by jack pine, red pine, red oak, red maple, or aspen. The forestland on the sandy outwash plains is most commonly dominated by relatively pure stands of jack pine. The forestland on the sandy and loamy upland moraines in the northern and southern parts of the county is dominantly red oak, red maple, red pine, jack pine, and aspen. Small areas of mixed sugar maple, beech, and basswood occur in the southeastern part of the county, mainly on the loamy and sandy end moraines in Nester Township. Some 25 to 30 percent of the forestland occurs as wetland. Most of the forested wetlands support northern white cedar, black spruce, tamarack, balsam fir, or jack pine.

The wood industry is of vital importance to the economy of Roscommon County. The harvesting and processing of wood products account for the employment of a large percentage of the workforce. Because of the large amount of forestland in the county and the close proximity to wood processing industries, much of the future economy of the county will continue to be based on forestland products. Proper forestland management, on both public and private lands, will be required to ensure that the desired types of raw materials will be available in sufficient quantities to meet the future demands of the forest industry. Many forest products are produced within or adjacent to the county. The most important of these are described in the following paragraphs.

Pulpwood.—Most of the timber harvested is used in the production of pulpwood. Pulpwood is harvested from even-aged stands that are mature or over-mature. These stands originated from large-scale wildfires during the post-logging era near the turn of the 20th century. Pulpwood production will remain important in the future because of the close proximity of high-volume mills.

Lumber and pallets.—Red oak and red pine account for a large percentage of the sawtimber harvested in the county. Most of the sawlogs harvested are those that are sorted out during commercial pulpwood logging operations. Few of the logs produced are of veneer quality, but some are shipped out of the county for processing. Most logs are of lower quality and are generally made into low-grade lumber or pallets. Some plantations and naturally occurring stands of red pine are managed for high-quality lumber production, utility poles, or logs for log homes. Some isolated stands of red oak also are managed for long-term sawlog production.

Fuel wood.—A large percentage of the hardwood cut in the county is used to supply the fuel wood market. This market provides a strong demand for material that would otherwise have a low market value. Much of the fuel wood resource is also being directed to several wood-using energy plants in surrounding counties. These plants produce electricity from steam-driven turbines that use wood as a fuel source.

Table 7 can help woodland owners or forest managers plan the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; *L*, low strength; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, L, and N.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed also are subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain

silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in forestland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forestland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are suitable for commercial wood production.

Logging and harvesting of wood resources are important to the economy of Roscommon County (fig. 5). Table 8 provides expanded information concerning the operability of harvesting equipment. The table gives information about operating harvesting or thinning equipment in logging areas and on skid roads, log landings, and haul roads. Limitations are given for the most limiting season and for the preferred operating season. The most limiting season in this survey area generally is spring or late fall. In some areas, however, it is during dry periods in summer, when loose sand can limit trafficability on deep, excessively drained to well drained, sandy soils.

The preferred operating season is the period when harvesting or thinning causes the least amount of soil damage. This period generally is when the soil is not too wet or when the ground is frozen or partly frozen or has an adequate snow cover.

In table 8, a rating of *slight* indicates that the use of conventional logging equipment is not restricted if normal logging methods are used. A rating of *moderate* indicates that the use of equipment is restricted because of one or more soil factors. If wetness is a limitation, high flotation equipment or special procedures may be needed to prevent the formation of ruts. A rating of *severe* indicates that the kind of equipment that can be used is seriously restricted.

Logging areas and skid roads include areas where some or all of the trees are being cut. Generally, equipment traffic is least intensive in the logging areas. Skid roads, which generally are within the logging area, are roads or trails over which the logs are dragged or hauled from the stump to a log landing.

Log landings are areas where logs are assembled for transportation. Wheeled equipment may be used

Figure 5.—Using forestland harvesting practices that leave desirable seed trees standing promotes regeneration. In the foreground is an area of Graycalm-Grayling sands, 0 to 6 percent slopes, and in the background is an area of Klacking-Perecheney sands, 6 to 18 percent slopes.

more frequently in these areas than in any other areas affected by logging.

Haul roads are access roads leading from primary or surfaced roads to the logging areas. The logging roads serve as transportation routes for wheeled logging equipment and logging trucks. Generally, they are unpaved roads. Some are graveled.

Plant Communities

Table 9 lists plants that are typically associated with the soils in the survey area. The information in table 9 is based on sample sites. Sample sites were selected for vegetative analysis after detailed soil maps and soil series descriptions were completed in an area. Once the soils were verified, representative vegetative communities were selected in areas that were relatively free from recent disturbances. such as fire, tree harvesting, or noticeable insect or disease infestations. The sample sites were in areas that exhibited typical stocking densities.

The plots sampled were approximately 10,000 square feet. Plant species were identified and recorded, and an ocular estimate was made of the percent coverage for each species. Tree species were recorded by estimating the percent canopy coverage, and other plants were recorded by estimating the percent ground coverage. Coverage values were

grouped into seven classes for facilitation of compilation and clarification of results. The seven classes are: 1—less than 1 percent coverage; 2—1 to 5 percent coverage; 3—5 to 25 percent coverage; 4—25 to 50 percent coverage; 5—50 to 75 percent coverage; 6—75 to 95 percent coverage; and 7—95 to 100 percent coverage.

The number that follows each plant species in the table represents the mean coverage class for that species for the map unit or soil listed. This number can be correlated to the relative dominance of overstory and understory vegetation. Plants that have a high number cover more of the canopy or ground than those that have a low number.

The plants listed in table 9 for each map unit are a composite of two to ten sample sites. They are considered the typical plants that occur in areas of a map unit, but they are not the only plants that may occur. A complete listing is available in "Michigan Flora" (Voss, 1972; Voss, 1985; Voss, 1996). Only common names are used for the plants in table 9 (USDA/NRCS, National Forestry Manual).

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, yards, fruit trees, gardens, and cropland from wind and snow; help to keep snow on fields; and provide food and cover for wildlife. Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 10 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 10 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

Roscommon County is a major source of year-round recreational opportunities. State forest covers some 47 percent of the county. Houghton Lake, Higgins Lake, and St. Helens Lake offer about 55 miles of shoreline for cottages and for camping and boating. They also provide areas for fishing, water skiing, snow skiing, scuba diving, horseback riding, tennis, ice fishing, and snowmobiling. Fishing and canoeing are popular along the Muskegon River, the South Branch of the Au Sable River, and the Cut River. Hunting and fishing are major activities on the public lands. In addition to the State forest, recreational sites include South Higgins Lake State Park, Houghton Lake Wildlife Research Area, Houghton Lake Historical Village, and the Fireman's Memorial Monument. Also available are the Kirtland's Warbler Festival and cultural events at Kirtland Community College.

Privately owned recreational facilities are numerous. They include several golf courses, campgrounds, outdoor arcades, and sportsmen's clubs. There are also areas for cross-country skiing and rollerskating.

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 11, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these.

The information in table 11 can be supplemented by

other information in this survey, for example, interpretations for septic tank absorption fields, dwellings without basements, and local roads and streets.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet (fig. 6) or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and

Figure 6.—The ponding in this camp area is a result of the seasonal high water table.

boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Roscommon County has a diversity of wildlife habitat and wildlife species. Woodland habitat is the most abundant. It provides food and shelter for common upland game animals, such as white-tailed deer, cottontail rabbit, gray squirrel, and fox squirrel. Black bear, coyote, red fox, gray fox, bobcat, porcupine, badger, striped skunk, woodchuck, raccoon, red squirrel, flying squirrel, and opossum also inhabit the area. Common upland game birds include ruffed grouse, woodcock, snipe, and wild turkey.

The Kirtland's warbler is an endangered songbird that nests in Roscommon County. The preferred nesting habitat for this bird is young stands of jack pine. Habitat improvement projects have been established on State forest lands. These projects are designed to attract and maintain continual nesting populations of this species. Threatened bird species in the survey area include the bald eagle, osprey, and common loon.

Most of the woodland habitat in the survey area can be improved by increasing the food and cover available to wildlife. Planting grasses, small grain, and food-producing shrubs in woodland areas increases the supply of available food. Planting conifers, thick shrubs, and shelterbelts can improve the cover for wildlife. Wetland habitat provides food and cover for many wildlife species, such as beaver, bobcat, muskrat, mink, otter, and various types of waterfowl, herons, and shore birds. Houghton Lake, Higgins Lake, and St. Helen Lake provide more than 32,000 acres of open water and excellent habitat for a variety of fish species and waterfowl. The Au Sable River, the Muskegon River, the Cut River, and the Tittabawassee River contain good populations of sport fish. The lakes offer habitat for common game fish, such as northern pike, walleye, smallmouth bass, largemouth bass, and trout. Common panfish include crappie, perch, and bluegill.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, rye, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes

are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, ragweed, wintergreen, and bunchberry.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, aspen, cherry, beech, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, cattail, wildrice, bog laurel, leatherleaf, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, bobcat, coyote, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of

the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Building Site Development

Table 13 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, or other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Sanitary Facilities

Table 14 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations

are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, rock fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best

cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 15 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavation and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones or have a water table at a depth of 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent; are wet; or have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 15, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have

a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 16 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff (fig. 7). Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions.

Figure 7.—This diversion helps to prevent the sedimentation of lakes resulting from surface runoff.

A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

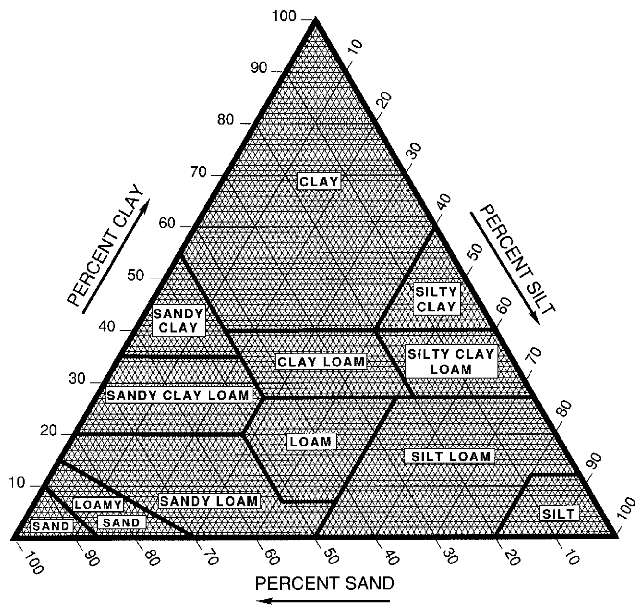

Figure 8.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 17 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 8). “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and

plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 18 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 18, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$- or $^{1}/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod

at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 18, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 18 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the “National Soil Survey Handbook” (USDA, NRCS).

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 19 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 18, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil

amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Soil Features

Table 20 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the thickness of the restrictive layer, which significantly affects the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Soil moisture greatly influences the type of vegetation, root growth, and germination; excavation, construction, and trafficability; chemical interactions, transport, and contamination; and soil strength, shrinking and swelling, and frost action. It is important to the classification of soils and wetlands and for cropland management. The tables described in this section provide estimates of several important water features.

Table 21 gives estimates of soil moisture for each map unit at various depths for every month of the year. *Moist* indicates the moisture condition in which soil water is most available for plant growth. *Dry* indicates the moisture status in which most plants (especially crops) cannot extract water for growth. *Wet* indicates a moisture condition in which free water will stand in an unlined hole or is at least too wet for the growth of agricultural species. For a typical year, a moisture status of “0.0-6.5: Moist” indicates that the soil is moist from the surface to a depth of 6.5 feet during the designated month. In the summer, the soil may show the effects of drying plus intermittent rains that result in a moist or wet layer over a dry layer that gets moist or wet again.

In table 22, *hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration

when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 22 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 22 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 23 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalfs*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Oxyaquic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is sandy, mixed, frigid Oxyaquic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff, 1999) and in “Keys to Soil Taxonomy” (Soil Survey Staff, 1998). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Allendale Series

The Allendale series consists of somewhat poorly drained soils on outwash plains, ground moraines, and collapsed lake plains. These soils formed in sandy sediments over clayey deposits underlain by sandy sediments. Permeability is rapid in the sandy material and very slow in the clayey material. Slopes range from 0 to 3 percent.

Taxonomic classification: Sandy over clayey, mixed, semiactive, frigid Alfic Epiaquods

Typical pedon of Allendale sand (fig. 9), 0 to 3

Figure 9.—Profile of Allendale sand. The upper part is sandy, and the lower part is loamy. Depth is marked in inches.

percent slopes, sandy substratum; on a northeast-facing slope of 3 percent, in a forested area, at an elevation of 1,173 feet; 1,100 feet south and 2,620 feet west of the northeast corner of sec. 28, T. 24 N., R. 1 W., Au Sable Township; USGS St. Helen NW 7.5-minute topographic quadrangle; lat. 44 degrees 02 minutes 53.87 seconds N. and long. 84 degrees 26 minutes 29.14 seconds W.

Oe—0 to 3 inches; black (5YR 2.5/1), partially decomposed forest litter.

E1—3 to 6 inches; brown (7.5YR 5/2) sand, pinkish gray (7.5YR 6/2) dry; weak medium blocky structure parting to weak fine and medium granular; very friable; many very fine and fine, common medium, and few coarse roots; 2 percent gravel; extremely acid; abrupt wavy boundary.

E2—6 to 8 inches; light brownish gray (10YR 6/2) sand, pinkish gray (7.5YR 7/2) dry; weak fine and medium granular structure; very friable; many very fine and fine, common medium, and few coarse roots; 2 percent gravel; very strongly acid; abrupt wavy boundary.

Bhs—8 to 10 inches; dark reddish brown (5YR 3/3) sand; moderate medium subangular blocky structure parting to moderate medium granular; friable; common very fine, fine, and medium roots and few coarse roots; columns of moderately cemented dark brown (7.5YR 3/3) ortstein extend into the Bs1 horizon; ortstein occupies 21 percent of the horizon; common medium and coarse prominent dark red (10R 3/6) masses of iron accumulation; 2 percent gravel; extremely acid; clear broken boundary.

Bs1—10 to 15 inches; dark brown (7.5YR 3/4) sand; moderate medium subangular blocky structure parting to moderate medium granular; very friable; common very fine, fine, and medium roots and few coarse roots; columns of moderately cemented dusky red (10R 3/3) and yellowish red (5YR 4/6) ortstein extend into the Bs2 horizon; ortstein occupies 18 percent of the horizon; common medium prominent red (2.5YR 4/6) masses of iron accumulation; 2 percent gravel; strongly acid; clear wavy boundary.

Bs2—15 to 21 inches; strong brown (7.5YR 4/6) sand; weak medium subangular blocky structure parting to single grain; very friable; common very fine and fine and few medium and coarse roots; columns of moderately cemented dark red (2.5YR 3/6) and yellowish red (5YR 4/6) ortstein extend into the Bs3 horizon; ortstein occupies 20 percent of the horizon; common fine prominent red (2.5YR 4/8) masses of iron accumulation; 2 percent gravel; strongly acid; gradual wavy boundary.

Bs3—21 to 31 inches; yellowish brown (10YR 5/6) sand; weak medium subangular blocky structure parting to single grain; very friable; few very fine, fine, and medium roots; columns of weakly cemented strong brown (7.5YR 5/6) ortstein; ortstein occupies 18 percent of the horizon; common coarse prominent dark red (10R 3/6) and yellowish red (5YR 5/8) masses of iron accumulation; 2 percent gravel; moderately acid; clear broken boundary.

E/B—31 to 37 inches; about 93 percent light yellowish brown (10YR 6/4) sand, very pale brown (10YR 7/3) dry (E); surrounding peds of reddish brown (5YR 4/3) sandy loam and loamy sand (Bt); weak coarse subangular blocky structure; very friable; few very fine roots; common fine prominent

yellowish red (5YR 4/6) and many coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; 2 percent gravel; strongly acid; abrupt broken boundary.

2Bt1—37 to 58 inches; dark brown (7.5YR 3/3) clay; strong coarse subangular blocky structure parting to weak coarse prismatic; very firm; common very fine and fine and few medium roots; many very fine continuous tubular pores; many prominent continuous light greenish gray (5G 7/1) clay films on vertical and horizontal faces of peds and few prominent discontinuous white (10YR 8/1) silt coatings on horizontal faces of peds; many medium prominent yellowish brown (10YR 5/6) and common medium and coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; common fine prominent light greenish gray (5G 7/1) iron depletions; 1 percent gravel; very strongly acid; gradual wavy boundary.

2Bt2—58 to 76 inches; brown (7.5YR 5/3) clay loam; moderate coarse subangular blocky structure; firm; few very fine roots; many very fine tubular pores; common prominent continuous greenish gray (5BG 6/1) clay films on vertical faces of peds and few distinct discontinuous brown (7.5YR 5/2) clay films on horizontal faces of peds; common fine prominent strong brown (7.5YR 5/8) and many fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; many fine and medium prominent light greenish gray (5BG 7/1) iron depletions; 5 percent gravel; moderately acid; abrupt wavy boundary.

3C—76 to 80 inches; brown (10YR 5/3) sand; single grain; loose; 1 percent gravel; common coarse distinct yellowish brown (10YR 5/6) masses of iron accumulation; neutral.

The depth to the Bt material ranges from 30 to more than 60 inches. The depth to the underlying sand (below the 2Bt horizon) ranges from 60 to 70 inches. The depth to carbonates ranges from 24 to more than 60 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 or 2.

The Bhs horizon has hue of 5YR or 7.5YR, value of 2.5 or 3, and chroma of 3. The texture is sand or loamy sand.

The Bs horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 6. The texture is sand or loamy sand.

The E part of the E/B horizon has hue of 10YR, value of 5 or 6, and chroma of 4. It is sand or loamy sand. Some pedons have a separate E horizon. The Bt part of the E/B horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma or 3 or 4. It is loamy sand or sandy loam.

The 2Bt1 horizon has hue of 7.5YR, value of 3 to 5, and chroma of 3 or 4.

The 2Bt2 horizon has hue of 7.5YR, value of 3 to 5, and chroma of 3 or 4. The texture is clay loam or silty clay loam.

Some pedons have a 2C horizon below the 2Bt horizon.

The 3C horizon has hue of 10YR, value of 5 or 6, and chroma of 3. It is dominantly sand, but the range includes thin strata of loamy sand. Some pedons do not have sand below a depth of 60 inches.

Au Gres Series

The Au Gres series consists of somewhat poorly drained soils on outwash plains and lake plains. These soils formed in sandy sediments. Permeability is rapid. Slopes range from 0 to 3 percent.

Taxonomic classification: Sandy, mixed, frigid Typic Endoaquods

Typical pedon of Au Gres sand (fig. 10), 0 to 3 percent slopes; on a northwest-facing slope of 1 percent, in a forested area, at an elevation of 1,182 feet; 2,300 feet north and 450 feet east of the southwest corner of sec. 3, T. 23 N., R. 1 W., Richfield Township; USGS St. Helen NW 7.5-minute topographic quadrangle; lat. 44 degrees 24 minutes 48.80 seconds N. and long. 84 degrees 25 minutes 41.53 seconds W.

Oe—0 to 1 inch; black (7.5YR 2.5/1), partially decomposed forest litter.

A—1 to 3 inches; black (7.5YR 2.5/1) sand, very dark gray (7.5YR 3/1) dry; weak fine and medium granular structure; very friable; many very fine, fine, and medium roots and common coarse roots; 1 percent gravel; extremely acid; abrupt smooth boundary.

E—3 to 5 inches; grayish brown (10YR 5/2) sand, light gray (10YR 7/1) dry; weak fine granular structure; very friable; many very fine, fine, and medium roots and common coarse roots; 1 percent gravel; extremely acid; abrupt wavy boundary.

Bhs—5 to 7 inches; dark brown (7.5YR 3/3) sand; weak fine and medium subangular blocky structure; friable; many very fine, fine, and medium roots and common coarse roots; extremely acid; 2 percent gravel; abrupt wavy boundary.

Bs1—7 to 14 inches; strong brown (7.5YR 4/6) sand; weak medium subangular blocky structure; very

Figure 10.—Profile of Au Gres sand. Au Gres soils are on outwash plains and lake plains. They have a seasonal high water table. Depth is marked in inches.

friable; few very fine, fine, and medium roots; 2 percent gravel; very strongly acid; clear wavy boundary.

Bs2—14 to 23 inches; yellowish brown (10YR 5/6) sand; single grain; loose; few very fine, fine, and medium roots; few medium prominent strong brown (7.5YR 5/8) and common fine prominent yellowish red (5YR 4/6) masses of iron accumulation; 2 percent gravel; very strongly acid; clear wavy boundary.

BC—23 to 33 inches; brownish yellow (10YR 6/6) sand; single grain; loose; common medium and coarse prominent yellowish red (5YR 4/6) masses of iron accumulation; 1 percent gravel; strongly acid; gradual wavy boundary.

C—33 to 80 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; common medium and coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation; 1 percent gravel; very strongly acid.

The depth to the C horizon ranges from 22 to 35 inches. Some pedons have 0 to 30 percent ortstein within the Bhs horizon. The content of gravel ranges from 0 to 8 percent throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 2 to 3, and chroma of 1 or 2.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 1 or 2.

The Bhs horizon has hue of 5YR or 7.5YR, value of 2.5 or 3, and chroma of 2 or 3.

The Bs horizon has hue of 5YR to 10YR and value and chroma of 4 to 6.

The BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 6.

Ausable Series

The Ausable series consists of very poorly drained soils on flood plains. These soils formed in thin organic deposits and sandy sediments. Permeability is moderate or moderately rapid in the upper organic sediment and rapid in the lower sandy deposit. Slopes range from 0 to 2 percent.

Taxonomic classification: Sandy, mixed, frigid Histic Humaquepts

Typical pedon of Ausable muck (fig. 11), frequently flooded; in an area of river bottom land, at an elevation of 1,148 feet; 1,285 feet north and 2,170 feet east of the southwest corner of sec. 23, T. 24 N., R. 2 W., Higgins Township; USGS Roscommon South 7.5-minute topographic quadrangle; lat. 44 degrees 27 minutes 19.39 seconds N. and long. 84 degrees 31 minutes 24.49 seconds W.

Oa—0 to 9 inches; muck, black (10YR 2/1) broken face and rubbed; about 15 percent fiber, 7 percent rubbed; weak fine subangular blocky structure parting to moderate medium granular; very friable; primarily woody fibers; about 10 percent woody fragments; 10 percent uncoated sand grains; many very fine, fine, and medium roots; strongly acid; abrupt wavy boundary.

C—9 to 14 inches; brown (10YR 5/3) sand with thin layers of black (10YR 2/1) muck 1/4 inch to 2 inches thick; muck layers contain 5 to 30 percent fibers; about 2 to 7 percent rubbed; about 10 percent woody fragments; single grain; loose; many very fine and fine and common medium

Figure 11.—Profile of Ausable muck. This soil is subject to frequent flooding. It has thin layers of muck in the upper part of the profile, below the surface layer. Depth is marked in inches.

roots; 3 percent gravel; very strongly acid; clear wavy boundary.

Cg—14 to 44 inches; dark grayish brown (10YR 4/2) sand with thin layers of black (10YR 3/2) muck 1/4 inch to 2 inches thick; muck layers contain 5 to 30 percent fibers, about 7 percent rubbed; about 10 percent woody fragments; single grain; loose; common very fine and fine and few medium roots; 2 percent gravel; strongly acid; gradual wavy boundary.

C´—44 to 80 inches; pale brown (10YR 6/3) sand; single grain; loose; 5 percent gravel; slightly alkaline.

The depth to the C horizon ranges from 8 to 12 inches. The content of gravel ranges from 0 to 5 percent throughout the profile. The organic bands in the C horizons have hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The O horizon has hue of 2.5YR or 10YR, value of 2 to 5, chroma of 1 to 3.

The C horizons have hue of 10YR, value of 4 to 6, and chroma of 3 to 6.

The Cg horizon has hue of 10YR, value of 4 to 6, and chroma of 2.

Bowers Series

The Bowers series consists of somewhat poorly drained soils on lake plains. These soils formed in stratified loamy deposits. Permeability is slow. Slopes range from 0 to 3 percent.

Taxonomic classification: Fine, mixed, semiactive, frigid Aquic Glossudalfs

Typical pedon of Bowers fine sandy loam, in an area of Bowers-Deerheart complex, 0 to 3 percent slopes; on a north-facing slope of 1 percent, in a forested area, at an elevation of 1,125 feet; 1,250 feet north and 1,500 feet east of the southwest corner of sec. 20, T. 22 N., R. 4 W., Roscommon Township; USGS Houghton Lake 7.5-minute topographic quadrangle; lat. 44 degrees 16 minutes 53.21 seconds N. and long. 84 degrees 49 minutes 35.45 seconds W.

A—0 to 3 inches; black (7.5YR 2.5/1) fine sandy loam, gray (10YR 5/1) dry; strong very fine granular structure; friable; many very fine, fine, and medium roots; moderately acid; 1 percent gravel; abrupt wavy boundary.

E—3 to 16 inches; light brownish gray (10YR 6/2) sandy loam, very pale brown (10YR 8/2) dry; moderate coarse subangular blocky structure parting to moderate thick platy; friable; many very fine, common fine, and few medium and coarse roots; common very fine vesicular and tubular pores; 2 percent mixing of A horizon; very few reddish black (2.5YR 2.5/1) iron-manganese stains throughout; common fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation; moderately acid; 1 percent gravel and 1 percent cobbles; clear wavy boundary.

E/B—16 to 20 inches; light brownish gray (10YR 6/2) sandy loam, very pale brown (10YR 8/2) dry (E); surrounding peds of brown (7.5YR 4/4) silty clay loam (Bt); strong fine to coarse subangular blocky structure; firm; common very fine, fine, and medium roots; common very fine vesicular and tubular pores; few prominent discontinuous dark brown (7.5YR 3/2) clay films on vertical and horizontal faces of peds; common fine prominent strong brown (7.5YR 4/6) and common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation; 1 percent gravel; moderately acid; clear wavy boundary.

Bt—20 to 43 inches; brown (7.5YR 4/4) and light yellowish brown (10YR 6/4), stratified silty clay loam and very fine sandy loam; strong fine, medium, and coarse angular blocky structure; firm; common very fine, fine, and medium roots; common very fine vesicular and tubular pores; common distinct brown (7.5YR 4/3) clay films on vertical and horizontal faces of peds; common fine prominent yellowish red (5YR 5/8) and common medium distinct strong brown (7.5YR 5/6) masses

of iron accumulation; few prominent light greenish gray (5GY 7/1) iron depletions; 1 percent gravel; slightly acid; gradual wavy boundary.

BC—43 to 52 inches; brown (7.5YR 5/4) and light yellowish brown (10YR 6/4), stratified silty clay loam and very fine sandy loam; strong medium and coarse angular blocky structure parting to strong medium and very thick platy; firm; few very fine and fine roots; common very fine vesicular and tubular pores; common prominent continuous brown (7.5YR 4/2) and very dark gray (5YR 3/1) and few prominent discontinuous greenish gray (10Y 6/1) clay films on vertical and horizontal faces of peds; common prominent continuous pink (5YR 8/3) carbonate coatings on vertical and horizontal faces of peds; common fine prominent strong brown (7.5YR 5/8) and many fine and medium prominent reddish yellow (7.5YR 6/8) masses of iron accumulation; common fine and medium prominent light greenish gray (10GY 7/1) iron depletions; 1 percent gravel; violently effervescent; moderately alkaline; gradual wavy boundary.

C1—52 to 73 inches; brown (7.5YR 5/4), pale yellow (2.5Y 7/4), and light brown (7.5YR 6/4), stratified silty clay loam, very fine sandy loam, and silt loam; strong medium and very thick platy structure; firm; few very fine roots; common very fine vesicular and tubular pores; few prominent discontinuous pale red (2.5YR 7/2) and gray (2.5Y 6/1) carbonate coatings on horizontal faces of peds; common fine prominent yellowish red (5YR 5/8) and many medium prominent reddish yellow (7.5YR 6/8) masses of iron accumulation; common fine prominent greenish gray (5GY 6/1) iron depletions; violently effervescent; slightly alkaline; 1 percent gravel; abrupt wavy boundary.

C2—73 to 80 inches; light yellowish brown (10YR 6/4), stratified loamy very fine sand and silt loam; massive; friable; many fine and medium prominent yellowish brown (10YR 5/8) masses of iron accumulation; violently effervescent; slightly alkaline.

The depth to the base of the argillic horizon ranges from 24 to more than 52 inches. The content of gravel is 0 to 1 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 3, and chroma of 1 or 2.

The E horizon and the E part of the E/B horizon have hue of 10YR, value of 5 or 6, and chroma of 2 or 3. The texture is loam or sandy loam.

The Bt horizon and the B part of the E/B horizon have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4. The texture is silty clay loam or clay loam with thin lenses of very fine sandy loam. Some pedons have a B/E horizon.

The BC horizon has colors and textures similar to those of the Bt horizon.

The C horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 or 4. It is dominantly silty clay loam or silt loam with strata of very fine sandy loam and very fine sand.

Bowstring Series

The Bowstring series consists of very poorly drained soils on flood plains. These soils formed in more than 51 inches of organic deposits that have thin layers of sand. Permeability ranges from moderately rapid to moderately slow. Slopes are 0 to 1 percent.

Taxonomic classification: Euic, frigid Fluvaquentic Haplosaprists

Typical pedon of Bowstring muck, in an area of Ausable-Bowstring mucks, frequently flooded; in a forested area, at an elevation of 1,150 feet; 2,300 feet east and 800 feet south of the northwest corner of sec. 35, T. 27 N., R. 4 W., Frederic Township, Crawford County; USGS Lake Margrethe 7.5-minute topographic quadrangle; lat. 44 degrees 41 minutes 39.12 seconds N. and long. 84 degrees 45 minutes 19.14 seconds W.

Oa1—0 to 19 inches; muck, black (N 2.5/0) broken face and rubbed; about 10 percent fiber, less than 2 percent rubbed; moderate medium and coarse subangular blocky structure parting to weak fine granular; very friable; common fine and medium and few coarse roots; primarily herbaceous fibers with about 5 percent woody fragments; thin bands of gray (5Y 5/1) sand in the lower 5 inches; neutral; clear smooth boundary.

Oa2—19 to 34 inches; muck, dark reddish brown (5YR 2.5/2) broken face, black (10YR 2/1) rubbed; about 30 percent fiber, less than 2 percent rubbed; massive; primarily herbaceous fibers; slightly alkaline; abrupt smooth boundary.

Cg—34 to 38 inches; gray (5Y 5/1) sand; single grain; loose; thin bands of very dark brown (10YR 2/2) muck; slightly alkaline; abrupt smooth boundary.

O´a—38 to 80 inches; muck, very dark brown (10YR 2/2) broken face and rubbed; about 15 percent fiber, less than 2 percent rubbed; massive; primarily herbaceous fibers; thin bands of gray (5Y 5/1) sand throughout the horizon; slightly alkaline.

The organic material is primarily herbaceous, but woody material makes up as much as 30 percent in some pedons. The thickness of the organic layers ranges from 16 to 51 inches. Thin layers of mineral soil

material are within the organic material. The thickness of the Cg horizon does not exceed 8 inches. The depth to the Cg horizon ranges from 18 to 48 inches.

The O horizons have hue of 5YR to 10YR, value of 2 to 3, and chroma of 1 or 2, or they are neutral in hue and have value of 2. The organic material is dominantly muck, but some pedons have thin layers of mucky peat.

The C horizon has hue of 10YR or 5Y, value of 5 or 6, and chroma of 1 or 2.

Chinwhisker Series

The Chinwhisker series consists of moderately well drained soils on outwash plains. These soils formed in sandy sediments. Permeability is rapid. Slopes range from 0 to 4 percent.

Taxonomic classification: Sandy, mixed, frigid Lamellic Haplorthods

Typical pedon of Chinwhisker sand, 0 to 4 percent slopes; on a southwest-facing slope of 1 percent, in a forested area, at an elevation of 1,185 feet; 3,760 feet south and 330 feet east of the northwest corner of sec. 4, T. 24 N., R. 4 W., Lyon Township; USGS Cote Dame Marie 7.5-minute topographic quadrangle; lat. 44 degrees 30 minutes 02.24 seconds N. and long. 84 degrees 48 minutes 18.78 seconds W.

Oe—0 to 2 inches; black (10YR 2/1), partially decomposed forest litter.

A—2 to 3 inches; black (10YR 2/1) sand, dark grayish brown (10YR 4/2) dry; weak medium granular structure; very friable; very strongly acid; abrupt smooth boundary.

E—3 to 7 inches; brown (7.5YR 5/2) sand, brown (7.5YR 5/2) dry; weak fine subangular blocky structure parting to weak medium granular; very friable; strongly acid; abrupt wavy boundary.

Bs1—7 to 10 inches; dark brown (7.5YR 3/4) sand; weak fine subangular blocky structure; very friable; moderately acid; clear wavy boundary.

Bs2—10 to 15 inches; brown (7.5YR 4/4) sand; single grain; loose; slightly acid; clear wavy boundary.

Bs3—15 to 23 inches; yellowish brown (10YR 5/4) sand; single grain; loose; neutral; clear wavy boundary.

E´1—23 to 57 inches; light yellowish brown (10YR 6/4) sand, light brownish gray (10YR 6/2) dry; single grain; loose; common faint distinct yellowish brown (10YR 5/8) masses of iron accumulation; neutral; gradual wavy boundary.

E´2—57 to 72 inches; pale brown (10YR 6/3) sand, light gray (10YR 7/2) dry; single grain; loose; common coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; neutral; gradual wavy boundary.

E and Bt—72 to 80 inches; pale brown (10YR 6/3) sand, light gray (10YR 7/2) dry (E´); strong brown (7.5YR 5/6) loamy sand and sandy loam (Bt); single grain; loose; common coarse prominent light reddish brown (5YR 6/3) and strong brown (7.5YR 5/8) masses of iron accumulation; reddish gray (5YR 5/2) iron depletions; neutral.

The content of gravel ranges from 0 to 7 percent throughout the profile. The depth to lamellae ranges from 20 to more than 70 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The E horizon has hue of 7.5YR, value of 4 or 5, and chroma of 2.

The Bs1 horizon has hue of 7.5YR and value and chroma of 3 or 4. The value and chroma of 3 do not occur together.

The Bs2 and Bs3 horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

The E part of the E and Bt horizon has hue of 10YR, value of 6, and chroma of 2 to 4. The Bt part has hue of 7.5YR, value of 5 or 6, and chroma of 6. The texture of the Bt part is sandy loam or loamy sand. The Bt part of this horizon consists of lamellae 1/8 to 1 inch thick. The cumulative thickness of the lamellae is 4 inches or less.

Some pedons have a C horizon below the E and Bt horizon. The C horizon, if it occurs, has hue of 10YR, value of 6, and chroma of 5 or 6.

Croswell Series

The Croswell series consists of moderately well drained soils on outwash plains and lake plains. These soils formed in sandy sediments. Permeability is rapid. Slopes range from 0 to 6 percent.

Taxonomic classification: Sandy, mixed, frigid Oxyaquic Haplorthods

Typical pedon of Croswell sand (fig. 12), 0 to 3 percent slopes; on a southwest-facing slope of 1 percent, in a forested area, at an elevation of 1,190 feet; 100 feet south and 2,570 feet east of the northwest corner of sec. 13, T. 23 N., R. 1 W., Richfield Township; USGS St. Helen NW 7.5-minute topographic quadrangle; lat. 44 degrees 23 minutes 33.04 seconds N. and long. 84 degrees 22 minutes 48.50 seconds W.

Oe—0 to 1 inch; very dusky red (2.5YR 2.5/2), partially decomposed forest litter.

A—1 to 2 inches; black (5YR 2.5/1) sand, black (5YR

Figure 12.—Profile of Croswell sand. Croswell soils formed in sandy sediments. Depth is marked in inches.

2.5/1) dry; weak fine granular structure; very friable; many very fine and fine and common medium and coarse roots; 2 percent gravel; extremely acid; abrupt wavy boundary.

E—2 to 6 inches; pinkish gray (7.5YR 6/2) sand, pinkish gray (7.5YR 7/2) dry; weak fine subangular blocky structure parting to weak very fine and fine subangular blocky; very friable; many very fine and fine and common medium and coarse roots; 2 percent gravel; extremely acid; abrupt wavy boundary.

Bs1—6 to 8 inches; dark brown (7.5YR 3/4) sand; weak fine subangular blocky structure; very friable; common very fine, fine, and medium roots and few coarse roots; 3 percent gravel; very strongly acid; abrupt broken boundary.

Bs2—8 to 17 inches; brown (7.5YR 4/4) sand; weak fine and medium subangular blocky structure; very friable; common very fine and fine and few medium and coarse roots; 8 percent columns of moderately or weakly cemented brown (7.5YR 4/4) and dark reddish brown (5YR 3/3) ortstein extend into the Bs3 horizon; 5 percent gravel; strongly acid; gradual smooth boundary.

Bs3—17 to 24 inches; yellowish brown (10YR 5/6) sand; single grain; loose; few very fine to coarse roots; columns of moderately or weakly cemented brown (7.5YR 4/4) and dark reddish brown (5YR 3/3) ortstein; ortstein occupies 24 percent of the horizon; few medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; 4 percent gravel; moderately acid; gradual smooth boundary.

BC—24 to 42 inches; brownish yellow (10YR 6/8) sand; single grain; loose; few very fine and fine roots; common medium distinct strong brown (7.5YR 5/8) and few medium prominent red (2.5YR 5/8) masses of iron accumulation; 1 percent gravel; moderately acid; clear wavy boundary.

C1—42 to 58 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; common medium and coarse prominent red (2.5YR 5/8) masses of iron accumulation; 1 percent gravel; slightly acid; gradual wavy boundary.

C2—58 to 80 inches; pale brown (10YR 6/3) sand; single grain; loose; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; 2 percent gravel; moderately acid.

The depth to the C horizon ranges from 26 to more than 42 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The E horizon has hue of 5YR to 10YR, value of 5 to 7, and chroma of 2 or 3.

The Bs1 horizon has hue of 7.5YR, value of 3 or 4, and chroma of 4.

The Bs2 and Bs3 horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

The BC horizon has hue of 10YR, value of 5 or 6, and chroma of 5 to 8.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

Cublake Series

The Cublake series consists of moderately well drained soils on outwash plains and lake plains. These soils formed in sandy sediments underlain by stratified loamy and sandy deposits. Permeability is moderately

rapid or rapid in the sandy material and moderately slow in the stratified material. Slopes range from 0 to 6 percent.

Taxonomic classification: Sandy, mixed, frigid Oxyaquic Haplorthods

Typical pedon of Cublake sand, 0 to 6 percent slopes; on a north-facing slope of 1 percent, in a forested area, at an elevation of 1,172 feet; 470 feet south and 530 feet east of the northwest corner of sec. 33, T. 24 N., R. 1 W., Au Sable Township; USGS St. Helen NW 7.5-minute topographic quadrangle; lat. 44 degrees 26 minutes 08.64 seconds N. and long. 84 degrees 26 minutes 56.06 seconds W.

Oe—0 to 2 inches; black (10YR 2/1), partially decomposed forest litter.

E—2 to 8 inches; pinkish gray (7.5YR 6/2) sand, pinkish gray (7.5YR 7/2) dry; weak fine subangular blocky structure parting to weak fine granular; very friable; many very fine and fine and few medium and coarse roots; 2 percent gravel; very strongly acid; abrupt wavy boundary.

Bs1—8 to 14 inches; 45 percent brown (7.5YR 4/4), 40 percent strong brown (7.5YR 4/6), and 15 percent dark brown (7.5YR 3/3) sand; weak fine subangular blocky structure; very friable; many very fine and fine and few medium and coarse roots; 3 percent gravel; strongly acid; clear wavy boundary.

Bs2—14 to 20 inches; strong brown (7.5YR 4/6) sand; weak fine subangular blocky structure; very friable; common very fine and fine and few coarse roots; columns of weakly cemented dark brown (7.5YR 3/4) ortstein; ortstein occupies 11 percent of the horizon; 3 percent gravel; strongly acid; clear wavy boundary.

Bs3—20 to 37 inches; yellowish brown (10YR 5/6) sand; moderate coarse subangular blocky structure; very friable; few very fine, fine, and coarse roots; common fine prominent yellowish red (5YR 5/6) masses of iron accumulation; 2 percent gravel; moderately acid; abrupt wavy boundary.

C1—37 to 53 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; few very fine, fine, and medium roots; common medium prominent yellowish red (5YR 4/6), common medium and coarse prominent yellowish red (5YR 5/8), and common coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; 1 percent gravel; moderately acid; abrupt smooth boundary.

2C2—53 to 65 inches; brown (10YR 5/3) and pale brown (10YR 6/3) very fine sandy loam, silt loam, and loamy fine sand; massive; friable; few very fine, fine, and medium roots; many medium and coarse prominent yellowish brown (10YR 5/8) masses of iron accumulation; common medium distinct gray (10YR 6/1) iron depletions; 1 percent gravel; neutral; gradual wavy boundary.

2C3—65 to 80 inches; brown (10YR 5/3), stratified very fine sandy loam, loam, and silt loam; massive; friable; few very fine and fine and few coarse roots; many fine and medium prominent yellowish brown (10YR 5/8) masses of iron accumulation; common medium distinct gray (10YR 5/1) and common fine prominent light greenish gray (10G 7/1) iron depletions; 1 percent gravel; violently effervescent; moderately alkaline.

The depth to the loamy 2C horizon ranges from 40 to 60 inches. The content of gravel ranges from 0 to 3 percent throughout the profile.

The E horizon has hue of 7.5YR, value of 5 or 6, and chroma of 1 or 2.

The Bs1 horizon has hue of 7.5YR, value of 3 or 4, and chroma of 4.

The Bs2 horizon has hue of 7.5YR and value and chroma of 4 to 6.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6.

The 2C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is typically stratified very fine sandy loam, loamy very fine sand, or very fine sand and has thin strata of silty clay loam, clay loam, silt loam, or loam.

Curtisville Series

The Curtisville series consists of well drained soils on end moraines. These soils formed in loamy deposits. Permeability is slow. Slopes range from 12 to 35 percent.

Taxonomic classification: Fine, mixed, semiactive, frigid Haplic Glossudalfs

Typical pedon of Curtisville loam, 12 to 18 percent slopes; on a northwest-facing slope of 16 percent, in a forested area, at an elevation of 940 feet; 870 feet south and 1,710 feet west of the northeast corner of sec. 34, T. 21 N., R. 1 W., Nester Township; USGS Butman 7.5-minute topographic quadrangle; lat. 44 degrees 10 minutes 24.05 seconds N. and long. 84 degrees 24 minutes 44.95 seconds W.

A—0 to 4 inches; very dark gray (10YR 3/1) loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; very friable; many very fine and fine and common medium roots; 2 percent gravel; moderately acid; abrupt wavy boundary.

E/B—4 to 9 inches; about 80 percent pale brown (10YR

6/3) loam, light gray (10YR 7/2) dry (E); surrounding peds of brown (7.5YR 5/4) sandy clay loam (Bt); moderate fine subangular blocky structure; firm; many very fine and common fine and medium roots; many very fine dendritic tubular pores; 4 percent gravel; moderately acid; clear wavy boundary.

B/E—9 to 16 inches; about 85 percent brown (7.5YR 5/4) clay loam (Bt); surrounded by pale brown (10YR 6/3) loam (E), light gray (10YR 7/2) dry; strong fine and medium subangular blocky structure; firm; common fine, medium, and coarse roots; common very fine dendritic tubular pores; common distinct discontinuous brown (7.5YR 4/3) clay films on vertical faces of peds; 5 percent gravel; moderately acid; clear wavy boundary.

Bt1—16 to 27 inches; brown (7.5YR 5/4) clay loam; strong medium and coarse subangular blocky structure; very firm; common very fine, fine, and medium roots; common very fine dendritic tubular pores; many distinct discontinuous brown (7.5YR 4/3) clay films on vertical and horizontal faces of peds; 5 percent gravel; moderately acid; clear wavy boundary.

Bt2—27 to 31 inches; dark yellowish brown (10YR 4/4) clay; moderate coarse subangular blocky structure; very firm; common very fine roots; common very fine dendritic tubular pores; common distinct discontinuous dark brown (7.5YR 3/4) clay films on vertical and horizontal faces of peds; 5 percent gravel; neutral; clear wavy boundary.

BC—31 to 33 inches; yellowish brown (10YR 5/4) clay loam; weak coarse subangular blocky structure; friable; common very fine dendritic tubular pores; common faint discontinuous yellowish brown (10YR 5/4) pressure faces on vertical faces of pads and few prominent discontinuous light gray (10YR 7/2) carbonate coatings on vertical faces of peds; slightly effervescent; moderately alkaline; 6 percent gravel; clear wavy boundary.

C—33 to 80 inches; pale brown (10YR 6/3) clay loam; weak coarse subangular blocky structure; friable; 5 percent gravel; violently effervescent; moderately alkaline.

The depth to the base of the argillic horizon ranges from 20 to 38 inches. The content of gravel ranges from 1 to 10 percent throughout the profile.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The E part of the E/B and B/E horizons has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3. The texture is loam or sandy loam.

The Bt horizon and the Bt part of the E/B and B/E horizons have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4.

The BC horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6.

Dawson Series

The Dawson series consists of very poorly drained soils on outwash plains, lake plains, and moraines. These soils formed in organic deposits 16 to 51 inches thick overlying sandy sediments. Permeability is moderately slow to moderately rapid in the organic material and rapid in the sandy material. Slopes range from 0 to 2 percent.

Taxonomic classification: Sandy or sandy-skeletal, mixed, dysic, frigid Terric Haplosaprists

Typical pedon of Dawson peat, in an area of Dawson-Loxley peats; on a south-facing slope of 1 percent, in a forested area, at an elevation of 1,192 feet; 2,640 feet south and 850 feet west of the northeast corner of sec. 24, T. 24 N., R. 1 W., Au Sable Township; USGS St. Helen NE 7.5-minute topographic quadrangle; lat. 44 degrees 27 minutes 21.46 seconds N. and long. 84 degrees 22 minutes 25.92 seconds W.

Oi—0 to 5 inches; peat, light yellowish brown (10YR 6/4) broken face and rubbed; about 95 percent sphagnum fiber, 18 percent rubbed; very friable; very strongly acid; abrupt wavy boundary.

Oa1—5 to 13 inches; muck, black (N 2.5/0) broken face and rubbed; about 10 percent fiber, 4 percent rubbed; moderate medium subangular blocky structure; very friable; very strongly acid; clear wavy boundary.

Oa2—13 to 19 inches; muck, black (N 2.5/0) broken face and rubbed; about 5 percent fiber, 2 percent rubbed; moderate medium subangular blocky structure; very friable; very strongly acid; abrupt wavy boundary.

Cg—19 to 26 inches; dark gray (10YR 4/1) sand; single grain; loose; strongly acid; abrupt wavy boundary.

C1—26 to 33 inches; dark brown (7.5YR 3/4) sand; single grain; loose; strongly acid; clear wavy boundary.

C2—33 to 42 inches; dark yellowish brown (10YR 4/6) sand; single grain; loose; moderately acid; gradual wavy boundary.

C3—42 to 80 inches; yellowish brown (10YR 5/6) sand; single grain; loose; moderately acid.

The organic layers are primarily derived from herbaceous material. The depth to sandy mineral layers ranges from 16 to 51 inches.

The surface tier has hue of 7.5YR or 10YR or is neutral in hue. It has value of 5 or 6 and chroma of 0 to 4. The thickness of the organic layers ranges from 16 to 51 inches.

The subsurface tiers have hue of 5YR to 10YR or are neutral in hue. They have value of 2 to 4 and chroma of 0 to 3. They are dominantly muck, but some pedons have thin layers of mucky peat.

The C horizons have hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 1 to 6. They are dominantly sand, but the range includes fine sand and individual horizons of gravelly sand. The content of gravel ranges from 0 to 20 percent.

Debolt Series

The Debolt series consists of moderately well drained soils on collapsed lake plains. These soils formed in clayey and loamy deposits underlain by sandy sediments. Permeability is slow in the clayey and loamy material and rapid in the sandy material. Slopes range from 0 to 3 percent.

Taxonomic classification: Clayey over sandy or sandy-skeletal, mixed, semiactive, frigid Oxyaquic Glossudalfs

Typical pedon of Debolt sandy loam, 0 to 3 percent slopes; on a north-facing slope, in an area of permanent pasture, at an elevation of 1,183 feet; 350 feet south and 650 feet west of the northeast corner of sec. 21, T. 24 N., R. 1 W., Au Sable Township; USGS St. Helen NW topographic quadrangle; lat. 44 degrees 27 minutes 49.95 seconds N. long. 84 degrees 23 minutes 31.81 seconds W.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) sandy loam, dark grayish brown (10YR 4/2) dry; strong medium granular structure parting to strong fine granular; friable; many very fine and common fine and medium roots; 1 percent gravel; moderately acid; abrupt smooth boundary.

E—3 to 7 inches; 55 percent grayish brown (10YR 5/2) and 45 percent pinkish gray (7.5YR 6/2) sandy loam, light brownish gray (10YR 6/2) and white (7.5YR 8/1) dry; moderate medium subangular blocky structure parting to strong fine subangular blocky; friable; common very fine, fine, and medium roots; few distinct discontinuous brown (7.5YR 5/2) silt coatings on vertical faces of peds; 1 percent gravel; moderately acid; clear broken boundary.

B/E—7 to 10 inches; about 77 percent brown (7.5YR 4/4) clay loam (Bt); surrounded by grayish brown (10YR 5/2) sandy loam (E), light gray (10YR 7/2) dry; strong medium subangular blocky structure; firm; common very fine, fine, and medium roots; common very fine tubular pores; very few prominent discontinuous black (7.5YR 2.5/1) organic coatings on vertical faces of peds; common distinct discontinuous brown (7.5YR 4/3) clay films on vertical faces of peds; 1 percent gravel; moderately acid; clear wavy boundary.

Bt1—10 to 18 inches; brown (7.5YR 4/4) clay; strong medium angular blocky structure; firm; common very fine and fine roots; common very fine tubular pores; very few prominent discontinuous black (7.5YR 2.5/1) organic coatings on vertical faces of peds; common distinct continuous brown (7.5YR 4/3) clay films on vertical and horizontal faces of peds; 1 percent gravel; moderately acid; clear wavy boundary.

Bt2—18 to 28 inches; brown (7.5YR 5/4) clay; strong coarse angular blocky structure parting to strong medium angular blocky; firm; common very fine and fine roots; common very fine tubular pores; common distinct continuous brown (7.5YR 4/3) clay films on vertical and horizontal faces of peds; few fine faint strong brown (7.5YR 5/6) masses of iron accumulation; 1 percent gravel; strongly acid; clear wavy boundary.

Bt3—28 to 33 inches; strong brown (7.5YR 5/6) sandy clay loam; strong coarse subangular blocky structure parting to moderate medium subangular blocky; firm; common very fine roots; few distinct discontinuous brown (7.5YR 5/4) clay films on vertical faces of peds; common distinct continuous strong brown (7.5YR 5/6) clay films on vertical and horizontal faces of peds; common fine and medium faint strong brown (7.5YR 5/6) masses of iron accumulation; 2 percent gravel; strongly acid; abrupt wavy boundary.

2C1—33 to 56 inches; yellowish brown (10YR 5/4) sand; single grain; loose; common fine and medium prominent dark reddish brown (5YR 3/3) and reddish brown (5YR 4/4) masses of iron accumulation; 1 percent gravel; moderately acid; gradual wavy boundary.

2C2—56 to 65 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; common fine prominent reddish brown (5YR 4/4) masses of iron accumulation; 1 percent gravel; slightly acid; gradual wavy boundary.

2C3—65 to 80 inches; brown (7.5YR 5/4) and pale brown (10YR 6/3) sand; single grain; loose; common medium and coarse prominent brownish yellow (10YR 6/6) and many medium and coarse

distinct yellowish brown (10YR 5/4) masses of iron accumulation; 1 percent gravel; neutral.

The depth to the base of the argillic horizon ranges from 20 to 40 inches. The content of gravel ranges from 1 to 5 percent in the upper part of the profile and from 0 to 10 percent in the lower part. Reaction ranges from neutral to strongly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Pedons in cultivated areas have an Ap horizon, which is 6 to 10 inches thick.

The E horizon and the E part of the B/E horizon have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3.

The Bt part of the B/E horizon and the Bt1 and Bt2 horizons have hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 6. The texture is clay, clay loam, silty clay loam, or silty clay. The Bt3 horizon has colors similar to those of the Bt1 and Bt2 horizons. The Bt3 horizon is sandy clay loam, clay loam, or silty clay loam.

The 2C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is dominantly sand, but the range includes loamy sand or thin strata of loamy sand.

Deerheart Series

The Deerheart series consists of poorly drained soils on lake plains. These soils formed in stratified silty and loamy deposits. Permeability is slow. Slopes range from 0 to 2 percent.

Taxonomic classification: Fine-loamy, mixed, semiactive, nonacid, frigid Aeric Endoaquepts

Typical pedon of Deerheart silt loam, in an area of Bowers-Deerheart complex, 0 to 3 percent slopes; in a forested area, at an elevation of 1.152 feet; 750 feet north and 800 feet east of the southwest corner of sec. 15, T. 25 N., R. 2 W., South Branch Township, Crawford County; USGS Roscommon North 7.5-minute topographic quadrangle; lat. 44 degrees 33 minutes 29.21 seconds N. and long. 84 degrees 32 minutes 45.51 seconds W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine and medium subangular blocky structure; friable; many fine and common medium roots; many fine prominent strong brown (7.5YR 4/6) masses of iron accumulation; about 1 percent fine gravel; slightly acid; abrupt smooth boundary.

Bg—6 to 27 inches; gray (10YR 5/1) silty clay loam; moderate medium and coarse subangular blocky structure; firm; common fine and few medium roots; few distinct dark grayish brown (10YR 4/2) clay coatings in root channels; many fine prominent yellowish brown (10YR 5/8) masses of iron accumulation; common fine distinct gray (5Y 5/1) iron depletions; about 1 percent fine gravel; neutral; clear wavy boundary.

BC—27 to 43 inches; light olive brown (2.5Y 5/4) silty clay loam that has thin strata of silt and silt loam; moderate medium and coarse subangular blocky structure; firm; common prominent greenish gray (5GY 5/1) gray coatings on faces of peds and along fracture planes; about 10 percent light gray (10YR 7/1) calcium carbonate accumulations along faces of peds; many medium prominent yellowish brown (10YR 5/8) and common coarse prominent light brownish gray (10YR 6/2) masses of iron accumulation; about 1 percent fine gravel; strongly effervescent; moderately alkaline; clear wavy boundary.

C—43 to 80 inches; brown (10YR 5/3) silty clay loam stratified with light olive brown (2.5Y 5/4) very fine sandy loam, silt, and silt loam; massive; firm; many coarse distinct yellowish brown (10YR 5/6) masses of iron accumulation and common medium faint light brownish gray (10YR 6/2) iron depletions; about 1 percent fine and medium gravel; strong effervescent; moderately alkaline.

The depth to the C horizon ranges from 20 to 48 inches. The depth to free carbonates ranges from 20 to 35 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The Ap or A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Pedons in undisturbed areas have an A horizon.

The Bg horizon has hue of 10YR to 5G, value of 4 to 6, and chroma of 1 or 2. It is silty clay loam or clay loam.

The BC horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 2 to 4. It is dominantly silty clay loam or clay loam that has thin strata of clay, silt, silt loam, or very fine sandy loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 1 to 4. It is dominantly silty clay loam or clay loam that has strata of loamy very fine sand, very fine sandy loam, silt, silt loam, and clay.

Deford Series

The Deford series consists of very poorly drained soils on lake plains and outwash plains. These soils formed in sandy sediments. Permeability is rapid. Slopes range from 0 to 2 percent.

Taxonomic classification: Mixed, frigid Typic Psammaquents

Typical pedon of Deford muck; on a northwest-facing slope of 2 percent, in a forested area, at an elevation of 1,190 feet; 900 feet north and 1,770 feet west of the southeast corner of sec. 5, T. 24 N., R. 4 W., Lyon Township; USGS Cote Dame Marie topographic quadrangle; lat. 44 degrees 30 minutes 22.64 seconds N. and long. 84 degrees 49 minutes 39.95 seconds W.

Oa—0 to 1 inch; muck, black (10YR 2/1) broken face and rubbed; about 20 percent fiber, 10 percent rubbed; massive; very friable; strongly acid; abrupt smooth boundary.

A—1 to 2 inches; black (N 2.5/0) mucky sand, gray (10YR 5/1) dry; weak medium granular structure; very friable; strongly acid; abrupt wavy boundary.

Cg1—2 to 4 inches; grayish brown (10YR 5/2) sand; weak medium subangular blocky structure; very friable; strongly acid; clear wavy boundary.

Cg2—4 to 7 inches; light gray (10YR 7/2) sand; weak medium subangular blocky structure; very friable; strongly acid; clear wavy boundary.

C1—7 to 29 inches; brown (10YR 4/3) (uncoated sand grain) sand; single grain; loose; strongly acid; clear wavy boundary.

C2—29 to 33 inches; pale brown (10YR 6/3) (uncoated sand grain) sand; single grain; loose; moderately acid; gradual wavy boundary.

C3—33 to 80 inches; yellowish brown (10YR 5/4) sand; single grain; loose; moderately acid.

The depth to carbonates ranges from 30 to more than 60 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 10YR or is neutral in hue. It has value of 2 to 3 and chroma of 0 or 1. Some pedons have a layer of muck less than 8 inches thick on the surface. Colors are the result of uncoated sand grains.

Some pedons have a weakly developed E or Bw horizon.

The C horizon has hue of 10YR, value of 4 to 7, and chroma of 1 to 4. It is dominantly sand, but the range includes loamy sand and fine sand.

Finch Series

The Finch series consists of somewhat poorly drained soils on lake plains and outwash plains. These soils formed in sandy sediments. Permeability is moderate or moderately rapid in the ortstein layer and rapid in the rest of the profile. Slopes range from 0 to 3 percent.

Taxonomic classification: Sandy, mixed, frigid, shallow, ortstein Typic Duraquods

Typical pedon of Finch sand, 0 to 3 percent slopes; on a west-facing slope of 3 percent, in a forested area, at an elevation of 1,155 feet; 340 feet north and 150 feet west of the southeast corner of sec. 21, T. 24 N., R. 2 W., Higgins Township; USGS Roscommon South 7.5-minute topographic quadrangle; lat. 44 degrees 27 minutes 12.60 seconds N. and long. 84 degrees 33 minutes 07.07 seconds W.

Oe—0 to 3 inches; black (10YR 2/1), partially decomposed forest litter.

A—3 to 5 inches; black (10YR 2/1) sand, very dark gray (10YR 3/1) dry; weak medium and coarse granular structure; very friable; many very fine and fine and common medium and coarse roots; very strongly acid; abrupt wavy boundary.

E1—5 to 10 inches; light brownish gray (10YR 6/2) sand, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; very friable; many very fine and fine and common medium and coarse roots; strongly acid; clear wavy boundary.

E2—10 to 16 inches; grayish brown (10YR 5/2) sand, very pale brown (10YR 7/3) dry; weak medium and fine subangular blocky structure; very friable; few medium and common very fine and fine roots; very strongly acid; abrupt wavy boundary.

Bhsm—16 to 20 inches; dark reddish brown (5YR 2.5/2) sand; moderate medium subangular blocky structure parting to moderate very thick platy; very firm or extremely firm; common medium and many very fine and fine roots; columns of strongly cemented black (5YR 2.5/1) and dark reddish brown (5YR 2.5/2) ortstein extend into the Bs1 horizon; ortstein occupies 77 percent of the horizon; strongly acid; clear irregular boundary.

Bsm—20 to 22 inches; dark brown (7.5YR 3/4) sand; moderate medium subangular blocky structure parting to weak very thick platy; firm; common fine and medium roots; columns of weakly to strongly cemented ortstein; ortstein occupies 94 percent of the horizon; common fine faint brown (7.5YR 4/4) masses of iron accumulation; strongly acid; clear irregular boundary.

Bs—22 to 35 inches; brown (7.5YR 4/4) sand; weak medium subangular blocky structure; friable; few very fine and fine roots; columns of weakly cemented ortstein; ortstein occupies 83 percent of the horizon; common medium distinct strong brown (7.5YR 4/6) masses of iron accumulation; moderately acid; clear wavy boundary.

BC—35 to 45 inches; strong brown (7.5YR 4/6) sand; weak coarse subangular blocky structure parting to single grain; very friable; common medium prominent yellowish brown (10YR 5/4) masses of

iron accumulation; strongly acid; gradual wavy boundary.

C—45 to 80 inches; brown (7.5YR 5/4) sand; single grain; loose; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation; strongly acid.

The depth to the C horizon ranges from 30 to 50 inches. The depth to ortstein ranges from 6 to 24 inches. The content of gravel ranges from 0 to 5 percent throughout the profile. Reaction ranges from very strongly acid to moderately acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 or 2.

The Bhs horizon has hue of 5YR or 7.5YR, value of 2.5 or 3, and chroma of 1 or 2.

The Bs horizon has hue of 7.5YR, value of 3 or 4, and chroma of 4 to 6.

The BC horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 5.

Flink Series

The Flink series consists of somewhat poorly drained soils on lake plains and outwash plains. These soils formed in sandy sediments overlying stratified loamy deposits. Permeability is moderately rapid or rapid in the sandy material and moderately slow in the stratified loamy material. Slopes range from 0 to 3 percent.

Taxonomic classification: Sandy, mixed, frigid Typic Epiaquods

Typical pedon of Flink sand, 0 to 3 percent slopes; on a southeast-facing slope of 1 percent, in a forested area, at an elevation of 1,173 feet; 1,800 feet south and 935 feet east of the northwest corner of sec. 33, T. 24 N., R. 1 W., Au Sable Township; USGS St. Helen NW 7.5-minute topographic quadrangle; lat. 44 degrees 25 minutes 55.19 seconds N. and long. 84 degrees 26 minutes 51.86 seconds W.

Oa—0 to 2 inches; black (10YR 2/1), well decomposed forest litter.

E—2 to 7 inches; pinkish gray (7.5YR 6/2) sand, pinkish gray (7.5YR 7/2) dry; weak medium subangular blocky structure parting to weak medium granular; very friable; many very fine and fine and common medium and coarse roots; 1 percent gravel; moderately acid; abrupt wavy boundary.

Bs1—7 to 10 inches; dark brown (7.5YR 3/4) sand; weak medium subangular blocky structure; very friable; many very fine and fine, common medium, and few coarse roots; columns of weakly cemented ortstein extend into the Bs2 horizon; ortstein occupies 30 percent of the horizon; 1 percent gravel; strongly acid; clear wavy boundary.

Bs2—10 to 17 inches; brown (7.5YR 4/4) sand; weak medium subangular blocky structure; very friable; common very fine and fine and few fine and medium roots; columns of weakly cemented ortstein extend into the Bs3 horizon; ortstein occupies 20 percent of the horizon; common fine and medium prominent yellowish red (5YR 4/6) masses of iron accumulation; 2 percent gravel; moderately acid; clear wavy boundary.

Bs3—17 to 28 inches; strong brown (7.5YR 4/6) sand; weak medium and coarse subangular blocky structure; very friable; common very fine and few fine and medium roots; columns of weakly cemented ortstein extend from the Bs2 horizon; ortstein occupies 13 percent of the horizon; many medium and coarse distinct strong brown (7.5YR 5/8) masses of iron accumulation; 1 percent gravel; neutral; gradual wavy boundary.

BC—28 to 43 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few very fine and fine roots; common coarse prominent strong brown (7.5YR 5/8), many medium distinct brownish yellow (10YR 6/8), and common coarse prominent light olive brown (2.5Y 5/4) masses of iron accumulation; 4 percent gravel; slightly alkaline; gradual wavy boundary.

C1—43 to 55 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; few very fine roots; common coarse prominent strong brown (7.5YR 5/8) and common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation; 4 percent gravel; neutral; gradual wavy boundary.

2C2—55 to 60 inches; brown (10YR 4/3) loam; firm; many fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; common fine prominent greenish gray (5BG 6/1) iron depletions; massive; 4 percent gravel; slightly effervescent; moderately alkaline; clear wavy boundary.

2C3—60 to 80 inches; brown (10YR 5/3), stratified loam and clay loam; massive; firm; many fine faint light yellowish brown (10YR 6/4) and common fine prominent greenish gray (5BG 6/1) iron depletions; 4 percent gravel; violently effervescent; moderately alkaline.

The thickness of the sandy mantle and the depth to

the stratified loamy sediments range from 40 to 60 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

Some pedons have an A horizon. This horizon has hue of 7.5YR, value of 2 or 3, and chroma of 1 or 2.

The E horizon has hue of 7.5YR, value of 6, and chroma of 1 or 2.

The Bs1 horizon has hue of 7.5YR, value of 3, and chroma of 4.

The Bs2 and Bs3 horizons have hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6.

The BC horizon has hue of 10YR, value of 5 or 6, and chroma of 6.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 4.

The 2C horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. It is stratified loam and clay loam.

Fluvaquents

Fluvaquents consist of very poorly drained, rapidly permeable to slowly permeable soils on flood plains. These soils formed in material ranging from sandy to clayey. Slopes are 0 to 1 percent.

Typical pedon of Fluvaquents, in an area of Histosols-Fluvaquents complex, frequently flooded, in a wooded area, at an elevation of 1,087 feet; 150 feet south and 1,400 feet west of the northeast corner of sec. 20, T. 21 N., R. 4 W., Roscommon Township; USGS Houghton Lake 7.5-minute topographic quadrangle; lat. 44 degrees 12 minutes 14.60 seconds N. and long. 84 degrees 50 minutes 14.52 seconds W.

Oa—0 to 2 inches; muck, black (7.5YR 2.5/1) broken face and rubbed; about 10 percent fiber, 4 percent rubbed; weak medium subangular blocky structure; very friable; many fine and very fine roots; moderately acid; abrupt wavy boundary.

A—2 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak medium platy structure; very friable; common fine prominent strong brown (7.5YR 5/6) masses of iron accumulation; moderately acid; abrupt wavy boundary.

Cg—6 to 16 inches; grayish brown (10YR 5/2), stratified fine sandy loam and loamy fine sand with thin layers of very dark gray (10YR 3/1) organic material 1/8 to 1/4 inch thick; single grain; loose; many fine and medium strong brown (7.5YR 5/6) and common medium and coarse red (2.5YR 4/6) masses of iron accumulation; moderately acid; abrupt wavy boundary.

C—16 to 25 inches; light yellowish brown (10YR 6/4), stratified sand and loamy fine sand with thin layers of gray (2.5Y 5/1) organic material 1/2 inch to 2 inches thick; single grain; loose; common fine prominent brownish yellow (10YR 6/8) and yellowish brown (10YR 5/8) masses of iron accumulation; moderately acid; abrupt wavy boundary.

C´g1—25 to 39 inches; dark gray (2.5Y 4/1) silt loam with thin layers of very dark gray (7.5YR 3/1) organic material 1/2 inch to 2 inches thick; weak medium platy structure; firm; common fine and medium prominent yellowish red (5YR 5/8) masses of iron accumulation; slightly acid; abrupt wavy boundary.

C´g2—39 to 80 inches; grayish brown (2.5Y 5/2) loamy fine sand with thin layers of black (10YR 2/1) and very dark gray (7.5YR 3/1) organic material 1/2 inch to 2 inches thick; single grain; loose; slightly acid.

The mineral horizons have bands of organic material 1/8 inch to 2 inches thick.

The surface layer has hue of 7.5YR or 10YR, value of 2 to 3, and chroma of 1 or 2.

The mineral horizons below the surface layer have hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4. They are stratified sand, fine sand, fine sandy loam, loamy fine sand, and silt loam.

Geels Series

The Geels series consists of moderately well drained soils on lake plains and outwash plains. These soils formed in sandy sediments overlying clayey and loamy deposits. Permeability is rapid in the sandy part and slow in the clayey and loamy part. Slopes range from 0 to 3 percent.

Taxonomic classification: Sandy, mixed, frigid Oxyaquic Hapludalfs

Typical pedon of Geels sand (fig. 13), 0 to 3 percent slopes; on a west-facing slope of 1 percent, in a forested area, at an elevation of 1,194 feet; 200 feet north and 2,900 feet west of the southeast corner of sec. 24, T. 24 N., R. 1 W., Au Sable Township; USGS St. Helen NW 7.5-minute topographic quadrangle; lat. 44 degrees 27 minutes 01.28 seconds N. and long. 84 degrees 22 minutes 52.13 seconds W.

A—0 to 2 inches; black (10YR 2/1) sand, very dark gray (7.5YR 3/1) dry; moderate medium granular structure; very friable; many very fine, fine, and medium roots and common coarse roots; 2 percent gravel; strongly acid; abrupt smooth boundary.

Figure 13.—Profile of Geels sand. This soil has clayey and loamy deposits at a depth of 45 to 60 inches. Depth is marked in inches.

Bw1—2 to 9 inches; dark yellowish brown (10YR 4/4) sand; weak medium subangular blocky structure; very friable; many very fine and fine, common medium, and few coarse roots; 2 percent gravel; moderately acid; clear wavy boundary.

Bw2—9 to 14 inches; dark yellowish brown (10YR 4/6) sand; weak fine and medium subangular blocky structure; very friable; common very fine and fine and few medium and coarse roots; 3 percent gravel; slightly acid; clear wavy boundary.

Bw3—14 to 21 inches; yellowish brown (10YR 5/6) sand; weak medium subangular blocky structure; very friable; common very fine and fine and few medium and coarse roots; 3 percent gravel; slightly acid; gradual wavy boundary.

Bw4—21 to 29 inches; brownish yellow (10YR 6/6) sand; single grain; loose; common very fine and fine and few medium and coarse roots; 2 percent gravel; neutral; gradual wavy boundary.

E—29 to 49 inches; light yellowish brown (10YR 6/4) sand, light brownish gray (10YR 6/2) dry; single grain; loose; few very fine, fine, and medium roots; few fine and medium distinct brownish yellow (10YR 6/8) and few medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; 1 percent gravel; neutral; abrupt smooth boundary.

2Bt—49 to 55 inches; brown (10YR 4/3) silty clay; strong medium subangular blocky structure parting to moderate medium prismatic; very firm; few very fine, fine, and medium roots; common very fine and fine tubular pores; common thin distinct brown (10YR 4/3) clay films on vertical and horizontal faces of peds; common medium distinct dark yellowish brown (10YR 4/6) masses of iron accumulation; few fine prominent (10YR 6/1) iron depletions; 1 percent gravel; slightly alkaline; clear smooth boundary.

2BC—55 to 71 inches; brown (10YR 5/3) silty clay; strong medium angular blocky structure; very firm; few very fine and fine roots; very few very fine tubular pores; common discontinuous prominent very pale brown (10YR 7/3) and common discontinuous prominent gray (10YR 6/1) silt coatings on vertical and horizontal faces of peds; common medium distinct brownish yellow (10YR 6/6) and common medium faint yellowish brown (10YR 5/4) masses of iron accumulation; few fine prominent grayish brown (10YR 5/2) iron depletions; 1 percent gravel; strongly effervescent; moderately alkaline; clear smooth boundary.

2C—71 to 80 inches; brown (10YR 5/3) clay loam; moderate fine and medium subangular blocky structure; firm; few faint brown (10YR 5/3) pressure faces on peds; few coarse faint light yellowish brown (10YR 6/4) masses of iron accumulation; few fine faint grayish brown (10YR 5/2) iron depletions; 3 percent gravel; strongly effervescent; strongly alkaline.

The thickness of the sandy mantle and the depth to the loamy sediments range from 45 to 60 inches. The depth to the base of the argillic horizon ranges from 50 to 76 inches. The depth to redoximorphic features ranges from 29 to 40 inches. The content of gravel ranges from 0 to 3 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2.

Some pedons have an E horizon above the Bw horizon. The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2.

The Bw horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6.

The E horizon below the Bw horizon has hue of 10YR, value of 6 or 7, and chroma of 3 or 4.

The 2Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silty clay loam, clay, clay loam, or silty clay.

The 2BC horizon has hue of 10YR, value of 5 or 6, and chroma of 3.

The 2C horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

Gerrish Series

The Gerrish series consists of somewhat excessively drained soils on kame moraines and outwash plains. These soils formed in sandy, gravelly, and cobbly deposits. Permeability is rapid or very rapid. Slopes range from 0 to 45 percent.

Taxonomic classification: Mixed, frigid Lamellic Udipsamments

Typical pedon of Gerrish sand (fig. 14), 0 to 6 percent slopes; on a northwest-facing slope of 3 percent, in a forested area, at an elevation of 1,326 feet; 1,300 feet north and 1,950 feet west of the southeast corner of sec. 25, T. 21 N., R. 3 W., Roscommon Township; USGS Meredith NW 7.5-minute topographic quadrangle; lat. 44 degrees 10 minutes 45.21 seconds N. and long. 84 degrees 37 minutes 07.65 seconds W.

Figure 14.—Profile of Gerrish sand. This soil has gravelly textures in the upper part of the subsoil. Depth is marked in inches.

A—0 to 1 inch; black (7.5YR 2.5/1) sand, dark gray (7.5YR 4/1) dry; weak medium granular structure; very friable; many very fine and common fine and medium roots; 2 percent gravel; very strongly acid; abrupt wavy boundary.

E—1 to 3 inches; brown (7.5YR 4/2) sand, brown (7.5YR 5/2) dry; weak medium granular structure parting to weak fine granular; very friable; common very fine and fine and many medium roots; 6 percent gravel; very strongly acid; abrupt wavy boundary.

Bw1—3 to 10 inches; strong brown (7.5YR 4/6) gravelly sand; weak medium subangular blocky structure; very friable; common very fine and fine roots; 16 percent gravel; strongly acid; clear wavy boundary.

Bw2—10 to 20 inches; light yellowish brown (10YR 6/4) very gravelly sand; weak medium subangular blocky structure; very friable; common fine and medium roots; 33 percent gravel and 7 percent cobbles; moderately acid; clear wavy boundary.

Bw3—20 to 26 inches; yellowish brown (10YR 5/6) very gravelly sand; weak medium subangular blocky structure; very friable; common fine roots; 33 percent gravel; moderately acid; clear wavy boundary.

E and Bt—26 to 80 inches; light yellowish brown (10YR 6/4) sand (E); lamellae of brown (7.5YR 5/4) loamy sand (Bt); single grain; loose; lamellae are $^{1}/_{16}$ to $^{1}/_{4}$ inch thick and have a cumulative thickness of 4 inches; 1 percent gravel; moderately acid.

The depth to lamellae ranges from 20 to more than 40 inches. The content of gravel ranges from 15 to 35 percent in the Bw horizons and from 0 to 14 percent in the lower part of the profile. The content of cobbles ranges from 0 to 15 percent in the Bw horizons and from 0 to 3 percent in the E and Bt horizon.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 3, and chroma of 1 to 3.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 or 3. The texture is sand or gravelly sand.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. The texture is dominantly gravelly sand or very gravelly sand, but the range includes cobbly sand.

The E part of the E and Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 3 to 6. The Bt part has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The texture of the Bt part is loamy sand or sandy loam.

Graycalm Series

The Graycalm series consists of somewhat excessively drained soils on outwash plains and moraines. These soils formed in sandy sediments. Permeability is rapid. Slopes range from 0 to 45 percent.

Taxonomic classification: Mixed, frigid Lamellic Udipsamments

Typical pedon of Graycalm sand, 0 to 6 percent slopes; on a north-facing slope of 1 percent, in a forested area, at an elevation of 1,191 feet; 1,370 feet south and 2,450 feet east of the northwest corner of sec. 4, T. 24 N., R. 4 W., Lyon Township; USGS Cote Dame Marie 7.5-minute topographic quadrangle; lat. 44 degrees 30 minutes 24.73 seconds N. and long. 84 degrees 48 minutes 08.02 seconds W.

A—0 to 2 inches; black (10YR 2/1) sand, dark grayish brown (10YR 4/2) dry; weak medium granular structure; very friable; common very fine, fine, and medium roots; moderately acid; abrupt smooth boundary.

Bw1—2 to 7 inches; dark yellowish brown (10YR 4/6) sand; weak fine subangular blocky structure parting to single grain; very friable to loose; common very fine and fine and few medium roots; 2 percent gravel and 1 percent cobbles; moderately acid; clear smooth boundary.

Bw2—7 to 27 inches; yellowish brown (10YR 5/6) sand; single grain; loose; common fine and few very fine, medium, and coarse roots; about 4 percent gravel; moderately acid; clear wavy boundary.

E and Bt—27 to 80 inches; brownish yellow (10YR 6/6) sand (E); strong brown (7.5YR 5/6) and brown (7.5YR 4/4) loamy sand (Bt); single grain; loose; few very fine and fine roots; 4 percent gravel and 1 percent cobbles; strongly acid.

The content of gravel ranges from 0 to 14 percent throughout the profile. The depth to lamellae ranges from 18 to 29 inches. Some pedons have a thin E horizon below the A horizon.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 4 to 6.

The E part of the E and Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 4 to 6. The Bt part has hue of 10YR or 7.5YR and value and chroma of 4 to 6. The Bt part is dominantly loamy sand, but the range includes thin strata of sandy loam.

Some pedons have a C horizon below the E and Bt horizon.

Grayling Series

The Grayling series consists of excessively drained soils on outwash plains, lake plains, and moraines. These soils formed in sandy sediments. Permeability is rapid. Slopes range from 0 to 45 percent.

Taxonomic classification: Mixed, frigid Typic Udipsamments

Typical pedon of Grayling sand, 0 to 6 percent slopes; on a west-facing slope of 1 percent, in a forested area, at an elevation of 1,191 feet; 1,685 feet north and 1,935 feet west of the southeast corner of sec. 4, T. 24 N., R. 4 W., Lyon Township; USGS Houghton Lake 7.5-minute topographic quadrangle; lat. 44 degrees 29 minutes 37.49 seconds N. and long. 84 degrees 49 minutes 24.07 seconds W.

Oe—0 to 2 inches; black (10YR 2/1), partially decomposed forest litter.

A—2 to 3 inches; very dark brown (10YR 2/2) sand, dark grayish brown (10YR 4/2) dry; weak medium granular structure; very friable; common very fine, fine, and medium roots; about 2 percent gravel; strongly acid; abrupt smooth boundary.

E—3 to 4 inches; brown (10YR 5/3) sand, pale brown (10YR 6/3) dry; weak medium granular structure; very friable; common very fine, fine, and medium roots; about 2 percent gravel; strongly acid; abrupt smooth boundary.

Bw1—4 to 9 inches; dark yellowish brown (10YR 4/4) sand; weak medium granular structure; very friable; common very fine and fine and few medium roots; about 3 percent gravel; strongly acid; clear smooth boundary.

Bw2—9 to 23 inches; yellowish brown (10YR 5/6) sand; single grain; loose; few very fine and fine roots; about 3 percent gravel; strongly acid; clear wavy boundary.

BC—23 to 30 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few fine roots; about 5 percent gravel; moderately acid; clear wavy boundary.

C—30 to 80 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; few fine roots; about 2 percent gravel; moderately acid.

The depth to the C horizon ranges from 30 to 35 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2.

The Bw and BC horizons have hue of 10YR and value and chroma of 4 to 6.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. Some pedons have thin color bands below a depth of 60 inches.

Histosols

Histosols consist of very poorly drained soils on lake plains, outwash plains, moraines, and flood plains. These soils formed in organic deposits. Permeability ranges from moderately rapid to moderately slow. Slopes are 0 to 1 percent.

Typical pedon of Histosols, in an area of Histosols and Aquents, ponded, in an open area at an elevation of 1,152 feet; 155 feet south and 670 feet east of the northwest corner of sec. 21, T. 24 N., R. 2 W., Higgins Township; USGS Roscommon South 7.5-minute topographic quadrangle; lat. 44 degrees 27 minutes 56.02 seconds N. and long. 84 degrees 34 minutes 14.38 seconds W.

Oa—0 to 18 inches; black (10YR 2/1) muck; 2 percent rubbed and unrubbed fibers; massive; very friable; slightly acid; clear smooth boundary.

Cg—18 to 24 inches; black (10YR 2/1) mucky sand; massive; friable; slightly acid; clear wavy boundary.

C—24 to 47 inches; brown (10YR 4/3) sand; single grain; loose; neutral; gradual smooth boundary.

C´g—47 to 80 inches; light grayish brown (10YR 6/2) sand; single grain; loose; neutral.

The thickness of the organic material ranges from 16 to more than 51 inches. The surface horizons are dominantly muck or mucky peat, but the range includes peat. The subsurface horizons are dominantly muck, but the range includes mucky peat and peat. The organic material typically has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3. The mineral horizons in the substratum range from sand to clay. They have hue of 5YR to 5Y, value of 5 or 6, and chroma of 1 to 3.

Ingalls Series

The Ingalls series consists of somewhat poorly drained soils on lake plains and outwash plains. These soils formed in sandy sediments over loamy and silty deposits. Permeability is rapid in the upper sandy part and moderately slow in the lower part. Slopes range from 0 to 3 percent.

Taxonomic classification: Sandy over loamy, mixed, active, frigid Typic Endoaquods

Typical pedon of Ingalls sand (fig. 15), 0 to 3 percent slopes; on a northeast-facing slope of 2 percent, in a forested area, at an elevation of 1,038 feet; 1,600 feet east and 2,900 feet south of the northwest corner of sec. 17, T. 22 N., R. 4 W., Roscommon Township; USGS Houghton Lake 7.5-minute topographic quadrangle; lat. 44 degrees 17 minutes 50.69 seconds N. and long. 84 degrees 49 minutes 40.53 seconds W.

Oe—0 to 1 inch; dark brown (7.5YR 3/2), partially decomposed forest litter.

A—1 to 2 inches; black (10YR 2/1) sand, very dark gray (10YR 3/1) dry; weak very fine granular structure; very friable; many very fine and common fine and medium roots; 1 percent gravel; very strongly acid; abrupt smooth boundary.

E—2 to 7 inches; 60 percent brown (7.5YR 5/2) and 40 percent pinkish gray (7.5YR 6/2) sand; pinkish gray (7.5YR 7/2) dry; weak very fine granular structure; very friable; common very fine, fine, and medium roots; 1 percent gravel; very strongly acid; abrupt wavy boundary.

Bhs—7 to 11 inches; 70 percent dark brown (7.5YR 3/3) and 30 percent dark reddish brown (5YR 3/3) sand; weak medium subangular blocky structure parting to moderate fine subangular blocky; very friable; common very fine and fine roots; 1 percent gravel; very strongly acid; clear wavy boundary.

Bs1—11 to 14 inches; brown (7.5YR 4/4) sand; weak medium subangular blocky structure; very friable; common very fine and fine roots; 1 percent gravel; strongly acid; clear wavy boundary.

Figure 15.—Profile of Ingalls sand. This soil has stratified deposits of very fine sand and silt at a depth of 28 to 40 inches. Depth is marked in inches.

Bs2—14 to 19 inches; strong brown (7.5YR 4/6) sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; common fine distinct yellowish brown (10YR 5/8) masses of iron accumulation; 1 percent gravel; strongly acid; clear wavy boundary.

Bs3—19 to 26 inches; yellowish brown (10YR 5/6) sand; single grain; loose; common very fine roots; common fine distinct yellowish brown (10YR 5/8) masses of iron accumulation; 1 percent gravel; moderately acid; clear wavy boundary.

BC—26 to 33 inches; yellowish brown (10YR 5/6) sand; single grain; loose; common very fine roots; common medium distinct yellowish brown (10YR 5/8), common medium faint yellowish brown (10YR 5/6), and common medium distinct yellowish brown (10YR 5/4) masses of iron accumulation; moderately acid; abrupt wavy boundary.

2C—33 to 80 inches; yellowish brown (10YR 5/4), stratified loamy very fine sand, very fine sand, silt loam, and very fine sandy loam; weak thick platy structure parting to weak thin platy; friable; common very fine roots; common medium distinct yellowish brown (10YR 5/6), common medium prominent strong brown (7.5YR 5/8), and common coarse distinct brown (10YR 5/3) masses of iron accumulation; common coarse light brownish gray (10YR 6/2) iron depletions; slightly acid.

The depth to the 2C horizon and the depth to the stratified material range from 28 to 40 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2.

The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 3. The texture is sand, fine sand, or loamy sand.

The Bs horizon has hue of 7.5YR and value and chroma of 4 to 6. The texture is sand, fine sand, or loamy sand.

The BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. The texture is sand, fine sand, or loamy sand.

The 2C horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 2 to 4. It is dominantly stratified very fine sand and silt, but the range includes very fine sandy loam or loamy very fine sand and thin strata of silt loam, silty clay loam, or silty clay.

Kawkawlin Series

The Kawkawlin series consists of somewhat poorly drained soils on ground moraines and end moraines. These soils formed in loamy deposits. Permeability is slow. Slopes range from 1 to 4 percent.

Taxonomic classification: Fine, mixed, semiactive, frigid Aquic Glossudalfs

Typical pedon of Kawkawlin loam, 1 to 4 percent slopes; on a northeast-facing slope of 1 percent, in an open fallow area, at an elevation of 1,153 feet; 2,600 feet north and 1,540 feet west of the southeast corner of sec. 18, T. 23 N., R. 3 W., Markey Township; USGS Lyon Manor 7.5-minute topographic quadrangle; lat. 44 degrees 23 minutes 05.58 seconds N. and long. 84 degrees 43 minutes 10.48 seconds W.

A—0 to 3 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; strong fine granular structure; friable; many very fine, fine, and medium roots; 1 percent gravel; moderately acid; abrupt wavy boundary.

E—3 to 5 inches; light brownish gray (10YR 6/2) loam, very pale brown (10YR 7/3) dry; strong medium angular blocky structure; very firm; many very fine, fine, and medium roots; 1 percent gravel; strongly acid; abrupt wavy boundary.

B/E—5 to 9 inches; about 75 percent brown (10YR 4/3) clay loam (Bt); surrounded by light brownish gray (10YR 6/2) loam (E), very pale brown (10YR 7/3) dry; strong medium angular blocky structure parting to strong fine angular blocky; very firm; many very fine, fine, and medium roots; common fine and medium distinct dark yellowish brown (10YR 4/6) and few medium prominent brownish yellow (10YR 6/8) masses of iron accumulation; 1 percent gravel; very strongly acid; abrupt irregular boundary.

Bt1—9 to 18 inches; dark yellowish brown (10YR 4/4) clay loam; strong fine and medium angular blocky structure; very firm; many very fine, fine, and medium roots; common faint discontinuous brown (10YR 4/3) clay films on faces of peds; common medium distinct dark yellowish brown (10YR 4/6) and common medium prominent brownish yellow (10YR 6/8) masses of iron accumulation; 1 percent gravel; strongly acid; gradual wavy boundary.

Bt2—18 to 27 inches; brown (10YR 5/3) clay loam; strong fine and medium angular blocky structure; very firm; many very fine and fine and common medium roots; few prominent discontinuous very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; common distinct discontinuous brown (10YR 5/3) clay films on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; few fine and medium prominent greenish gray (5GY 6/1) iron depletions; 1 percent gravel; moderately acid; gradual wavy boundary.

Bt3—27 to 32 inches; dark yellowish brown (10YR 4/4) clay loam; strong medium angular blocky structure; very firm; many very fine and fine roots; common distinct discontinuous brown (10YR 4/3) clay films on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; few fine and medium prominent greenish gray (5GY 6/1) iron depletions; 1 percent gravel; moderately acid; clear wavy boundary.

C—32 to 80 inches; brown (10YR 5/3) clay loam; strong medium angular blocky structure; very firm; many very fine and fine roots; few prominent discontinuous light gray (10YR 7/1) carbonate coatings on vertical and horizontal faces of peds; 1 percent gravel; common medium prominent yellowish brown (10YR 5/8) masses of iron accumulation and common fine and medium prominent gray (5Y 6/1) iron depletions; moderately acid.

The depth to the base of the argillic horizon ranges from 32 to 39 inches. The content of gravel ranges from 0 to 8 percent throughout the profile.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Some pedons have an Ap horizon.

The E horizon and the E part of the B/E horizon have hue of 10YR, value of 5 or 6, and chroma of 2. The texture is sandy loam or loam.

The Bt horizon and the Bt part of the B/E horizon have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

Kellogg Series

The Kellogg series consists of moderately well drained soils on lake plains. These soils formed in sandy sediments over loamy and clayey deposits underlain by sandy sediments. Permeability is rapid in the sandy material and moderate to slow in the loamy and clayey material. Slopes range from 0 to 6 percent.

Taxonomic classification: Sandy over clayey, mixed, active, frigid Alfic Oxyaquic Haplorthods

Typical pedon of Kellogg sand, 0 to 6 percent slopes, sandy substratum; on a northwest-facing slope of 1 percent, in a forested area, at an elevation of 1,195 feet; 2,070 feet north and 1,370 feet east of the southwest corner of sec. 36, T. 24 N., R. 1 W., Au Sable Township; USGS St. Helen NW 7.5-minute topographic quadrangle; lat. 44 degrees 25 minutes 38.60 seconds N. and long. 84 degrees 23 minutes 06.78 seconds W.

Oe—0 to 1 inch; black (7.5YR 2.5/1), partially decomposed forest litter.

A—1 to 3 inches; black (7.5YR 2.5/1) sand, black (7.5YR 2.5/1) dry; moderate medium granular structure; very friable; many very fine and fine and common medium and coarse roots; 1 percent gravel; very strongly acid; abrupt wavy boundary.

E—3 to 7 inches; brown (7.5YR 5/2) sand, pinkish gray (7.5YR 6/2) dry; weak fine and medium subangular blocky structure; very friable; common very fine,

fine, and medium roots; 1 percent gravel; very strongly acid; clear wavy boundary.

Bs1—7 to 13 inches; brown (7.5YR 4/4) sand; weak fine and medium subangular blocky structure; very friable; common very fine to coarse roots; 3 percent gravel; strongly acid; clear wavy boundary.

Bs2—13 to 19 inches; strong brown (7.5YR 4/6) sand; weak fine and medium subangular blocky structure; very friable; few very fine, fine, medium, and coarse roots; 6 percent gravel; strongly acid; abrupt wavy boundary.

Bs3—19 to 32 inches; yellowish brown (10YR 5/6) coarse sand; weak medium and coarse subangular blocky structure parting to single grain; very friable; few very fine, fine, and medium roots; common medium distinct strong brown (7.5YR 5/6) and common fine prominent yellowish red (5YR 5/6) masses of iron accumulation; 8 percent gravel; moderately acid; abrupt wavy boundary.

2B/E—32 to 38 inches; about 70 percent brown (7.5YR 5/4) clay loam (Bt); moderate fine and medium subangular blocky structure; surrounded by grayish brown (10YR 5/2) loamy sand (E); moderate medium and coarse subangular blocky structure; firm; few very fine, fine, and medium roots; common very fine tubular pores; 30 percent columns of light brownish gray (10YR 6/2) sandy loam extend 12 to 19 inches into the 2Bt horizon; few prominent discontinuous pale red (2.5YR 7/2) clay films on faces of peds and common prominent discontinuous pale red (2.5YR 7/2) silt coatings on vertical and horizontal faces of peds; common fine and medium prominent strong brown (7.5YR 5/8), common fine prominent yellowish brown (10YR 5/6), and common medium distinct light red (2.5YR 6/6) masses of iron accumulation; 2 percent gravel; moderately acid; clear wavy boundary.

2Bt—38 to 65 inches; brown (7.5YR 5/4) clay; strong medium and coarse subangular blocky structure; firm; few very fine, fine, and medium roots; common prominent continuous brown (7.5YR 5/4) and light reddish gray (2.5YR 7/1) clay films on vertical and horizontal faces of peds; common fine and medium prominent strong brown (7.5YR 5/8), common fine prominent yellowish brown (10YR 5/6), and common medium distinct light red (2.5YR 6/6) masses of iron accumulation; common fine prominent light greenish gray (5GY 7/1) iron depletions; 2 percent gravel; slightly acid; clear wavy boundary.

3C1—65 to 70 inches; brown (7.5YR 5/3) loamy very fine sand; massive; friable; few very fine and fine roots; common very fine tubular pores; many medium and coarse prominent brownish yellow (10YR 6/6) and common medium and coarse prominent yellowish red (5YR 4/6) masses of iron accumulation; common fine prominent light greenish gray (10G 7/1) iron depletions; 1 percent gravel; moderately acid; clear wavy boundary.

3C2—70 to 80 inches; light yellowish brown (10YR 6/4) very fine sand; massive; friable; common medium and coarse distinct brownish yellow (10YR 6/6) and common fine and medium prominent brownish yellow (10YR 6/8) masses of iron accumulation; 1 percent gravel; moderately acid.

The depth of the top of the 2Bt horizon ranges from 21 to 40 inches. The content of gravel ranges from 0 to 8 percent throughout the profile.

The E horizon has hue of 7.5YR, value of 5 or 6, and chroma of 1 or 2. The texture is sand or loamy sand.

The Bs1 horizon has hue of 7.5YR, value of 3 or 4, and chroma of 4.

The Bs2 and Bs3 horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 5 or 6. The texture is sand or coarse sand.

The Bt part of the 2B/E horizon has hue of 7.5YR, value of 5, and chroma of 3 or 4. It is clay loam or silty clay loam. The E part of the 2B/E horizon has hue of 10YR, value of 5 to 7, and chroma of 2 or 3. It is sand or loamy sand.

The 2Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4. The texture is clay, silty clay, or silty clay loam.

The 3C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4. It is sand, fine sand, loamy very fine sand, or very fine sand.

Kinross Series

The Kinross series consists of very poorly drained soils on outwash plains, lake plains, and ground moraines. These soils formed in sandy sediments. Permeability is rapid. Slopes range from 0 to 2 percent.

Taxonomic classification: Sandy, mixed, frigid Typic Endoaquods

Typical pedon of Kinross muck; on a west-facing slope of 1 percent, in a forested area, at an elevation of 1,170 feet; 150 feet north and 2,400 feet west of the southeast corner of sec. 28, T. 24 N., R. 4 W., Lyon Township; USGS Meads Landing 7.5-minute topographic quadrangle; lat. 44 degrees 26 minutes 11.48 seconds N. and long. 84 degrees 48 minutes 17.60 seconds W.

Oi—0 to 1 inch; black (10YR 2/1), undecomposed forest litter.

Oa1—1 to 4 inches; muck, black (5YR 2.5/1) broken face and rubbed; about 25 percent fiber, 8 percent rubbed; weak medium and thick platy structure parting to weak medium granular; very friable; many very fine, fine, and medium roots and common coarse roots; extremely acid; abrupt wavy boundary.

Oa2—4 to 6 inches; muck, black (7.5YR 2.5/1) broken face and rubbed; about 5 percent fiber, 1 percent rubbed; moderate fine and medium subangular blocky structure; very friable; many very fine, fine, and medium roots and few coarse roots; extremely acid; abrupt wavy boundary.

E—6 to 13 inches; grayish brown (10YR 5/2) sand, pinkish gray (7.5YR 6/2) dry; weak fine and medium subangular blocky structure; very friable; few very fine to coarse roots; few prominent discontinuous black (7.5YR 2.5/1) organic coatings throughout; 1 percent gravel; extremely acid; abrupt wavy boundary.

Bhs—13 to 15 inches; dark brown (7.5YR 3/2) sand; weak coarse subangular blocky structure; friable; few very fine and fine roots; few fine prominent dark yellowish brown (10YR 4/4) masses of iron accumulation; 1 percent gravel; extremely acid; abrupt wavy boundary.

Bs—15 to 28 inches; brown (7.5YR 4/4) sand; single grain; loose; few very fine, fine, medium, and coarse roots; columns of weakly cemented dark reddish brown (2.5YR 3/3) ortstein extend into the BC horizon; ortstein occupies 15 percent of the horizon; common medium faint dark brown (7.5YR 3/4) masses of iron accumulation; 1 percent gravel; very strongly acid; gradual wavy boundary.

BC—28 to 45 inches; dark yellowish brown (10YR 4/4) sand; single grain; loose; few very fine to coarse roots; columns of weakly cemented dark brown (7.5YR 3/3) ortstein; ortstein occupies 10 percent of the horizon; 1 percent gravel; very strongly acid; gradual wavy boundary.

C—45 to 80 inches; brown (10YR 5/3) sand; single grain; loose; 1 percent gravel; strongly acid.

The depth to the C horizon ranges from 30 to 46 inches. The content of gravel ranges from 0 to 3 percent throughout the profile. Some pedons have as much as 30 percent fragments of weakly to strongly cemented ortstein in the Bhs horizon.

The O horizons have hue of 5YR to 10YR or are neutral in hue. They have value of 2 to 3 and chroma of 0 to 2. Some pedons have an A horizon.

The E horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2.

The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3.

The Bs horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 4 or 5.

The BC horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 6.

Klacking Series

The Klacking series consists of well drained soils on outwash plains and moraines. These soils formed in sandy and loamy deposits. Permeability is moderately rapid. Slopes range from 0 to 35 percent.

Taxonomic classification: Loamy, mixed, semiactive, frigid Arenic Glossudalfs

Typical pedon of Klacking sand (fig. 16), 0 to 6 percent slopes; on a south-facing slope of 1 percent, in a forested area, at an elevation of 1,210 feet; 50 feet south and 675 feet west of the northeast corner of sec. 35, T. 24 N., R. 1 W., Au Sable Township; USGS St. Helen NW 7.5-minute topographic quadrangle; lat. 44 degrees 26 minutes 08.48 seconds N. and long. 84 degrees 23 minutes 34.13 seconds W.

Oe—0 to 1 inch; black 7.5YR (2.5/1), partially decomposed forest litter.

A—1 to 3 inches; black (10YR 2/1) sand, very dark gray (7.5YR 3/1) dry; mixed with about 20 percent uncoated sand grains; weak fine and medium granular structure; very friable; many very fine, fine, and medium roots and common coarse roots; 13 percent discontinuous pockets of gray (10YR 5/1) sand; 3 percent gravel; strongly acid; abrupt wavy boundary.

Bw1—3 to 8 inches; dark yellowish brown (10YR 4/4) sand; weak fine subangular blocky structure; very friable; many very fine and fine and common medium and coarse roots; 3 percent gravel and 1 percent cobbles; moderately acid; clear wavy boundary.

Bw2—8 to 15 inches; brown (7.5YR 4/4) sand; weak fine and medium subangular blocky structure; very friable; common very fine, fine, and medium roots and few coarse roots; 5 percent gravel and 1 percent cobbles; moderately acid; clear wavy boundary.

Bw3—15 to 25 inches; yellowish brown (10YR 5/6) sand; weak fine and medium subangular blocky structure; very friable; common very fine, fine, and medium roots and few coarse roots; 7 percent gravel and 1 percent cobbles; moderately acid; clear wavy boundary.

Figure 16.—Profile of Klacking sand. The subsoil consists of mixed sandy and loamy material. Lamellae are in the lower part of the profile. Depth is marked in inches.

E and Bt—25 to 37 inches; light yellowish brown (10YR 6/4) sand, light gray (10YR 7/2) dry (E); weak fine and medium subangular blocky structure; loose; discontinuous lamellae of reddish brown (5YR 5/4) loamy sand (Bt) $^{1}/_{16}$ to $^{1}/_{2}$ inch thick; very friable; few very fine and fine roots; few faint discontinuous reddish brown (5YR 5/4) clay bridges between sand grains; 7 percent gravel and 1 percent cobbles; moderately acid; abrupt wavy boundary.

E/B—37 to 42 inches; about 60 percent light yellowish brown (10YR 6/4) sand (E), very pale brown (10YR 8/2) dry; weak fine and medium subangular blocky structure; very friable; surrounding peds of strong brown (7.5YR 4/6) loamy sand and sandy loam (Bt); weak medium and coarse subangular blocky structure; friable; few very fine and fine roots; common very fine tubular pores; few faint discontinuous strong brown (7.5YR 4/6) clay bridges between sand grains; 12 percent gravel and 1 percent cobbles; neutral; abrupt broken boundary.

B/E—42 to 54 inches; about 85 percent brown (7.5YR 4/4) and strong brown (7.5YR 4/6) sandy loam (Bt); surrounded by light yellowish brown (10YR 6/4) sand (E), very pale brown (10YR 8/2) dry; weak medium and coarse subangular blocky structure; firm; few very fine, fine, and medium roots; common very fine tubular pores; few distinct discontinuous brown (7.5YR 4/2) clay films on vertical and horizontal faces of peds; 5 percent gravel and 1 percent cobbles; neutral; abrupt wavy boundary.

Bt and E—54 to 68 inches; about 80 percent lamellae of brown (7.5YR 4/4) loamy sand (Bt) $^{1}/_{4}$ inch to 2 inches thick; weak fine subangular blocky structure parting to single grain; friable; light yellowish brown (10YR 6/4) and very pale brown (10YR 7/3) sand (E), very pale brown (10YR 7/3) and (10YR 8/2) dry; loose; few very fine and fine roots; many very fine tubular pores; many faint continuous brown (7.5YR 4/4) clay bridges throughout; 12 percent gravel and 1 percent cobbles; neutral; abrupt smooth boundary.

E and B´t—68 to 80 inches; very pale brown (10YR 7/3) sand (E), very pale brown (10YR 8/2) dry; weak medium subangular blocky structure parting to single grain; loose; lamellae of brown (7.5YR 5/4) loamy sand (Bt) $^{1}/_{4}$ inch to 2 inches thick; weak medium and coarse subangular blocky structure; friable; many faint continuous brown (7.5YR 5/4) clay bridges throughout; 1 percent gravel; neutral.

The content of gravel ranges from 0 to 14 percent throughout the profile. The depth to the Bt horizon ranges from 16 to more than 35 inches. The cumulative thickness of the lamellae ranges from 6 to 18 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

Some pedons have an E horizon below the A horizon.

The Bw horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is sand or loamy sand.

The E part of the E/B and B/E horizons has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The Bt part of the E/B and B/E horizons has hue of 7.5YR and value and chroma of 4 to 6. The Bt part is sandy loam or loamy sand.

The E part of the E and Bt horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 4. The Bt part of the E and Bt horizon has hue of 5YR to 10YR and value and chroma of 4 to 6. The Bt part is sandy loam or loamy sand.

Kneff Series

The Kneff series consists of moderately well drained soils on lake plains. These soils formed in stratified loamy and silty material. Permeability is moderately slow. Slopes range from 0 to 6 percent.

Taxonomic classification: Fine-silty, mixed, semiactive, frigid Oxyaquic Glossudalfs

Typical pedon of Kneff very fine sandy loam, 0 to 6 percent slopes; on a southwest-facing slope of 3 percent, in a forested area, at an elevation of 1,175 feet; 1,900 feet north and 1,050 feet west of the southeast corner of sec. 31, T. 25 N., R. 1 W., South Branch Township, Crawford County; USGS Eldorado 7.5-minute topographic quadrangle; lat. 44 degrees 30 minutes 57.51 seconds N. and long. 84 degrees 28 minutes 31.25 seconds W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) very fine sandy loam, light brownish gray (10YR 6/2) dry; moderate medium and coarse subangular blocky structure; friable; many very fine and fine roots; about 5 percent fine and medium gravel; strongly acid; abrupt smooth boundary.

B/E—8 to 14 inches; about 60 percent brown (7.5YR 4/4) silty clay loam (Bt); moderate medium and coarse subangular blocky structure; firm; surrounded by brown (10YR 5/3) very fine sandy loam (E), light gray (10YR 7/2) dry; many very fine and fine roots; about 3 percent fine and medium gravel; strongly acid; clear wavy boundary.

Bt1—14 to 23 inches; dark brown (7.5YR 4/4) silty clay loam; strong coarse angular blocky structure; firm; common very fine and fine roots; many faint dark brown (7.5YR 3/4) clay films on faces of peds and in root channels; strongly acid; clear wavy boundary.

Bt2—23 to 29 inches; dark brown (7.5YR 4/4) silty clay loam; strong coarse angular blocky structure; firm; common very fine and fine roots; many faint dark brown (7.5YR 3/4) clay films on faces of peds and in root channels; common medium distinct strong brown (7.5YR 4/6) masses of iron accumulation; strongly acid; clear wavy boundary.

C1—29 to 61 inches; stratified brown (10YR 4/3) silty clay loam, silt loam, and silty clay and dark yellowish brown (10YR 4/6) very fine sandy loam; massive; few fine roots in the upper 12 inches; common medium prominent strong brown (7.5YR 4/6) masses of iron accumulation; few fine prominent gray (5Y 6/1 and 5YR 6/1) iron depletions; slightly effervescent; slightly alkaline; clear wavy boundary.

2C2—61 to 80 inches; pale brown (10YR 6/3) sand that has strata of brown (10YR 4/3) silty clay loam and bands of pale brown (10YR 6/3) silt loam 1/4 inch to 6 inches thick; single grain; loose; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation; slightly effervescent; slightly alkaline.

The thickness of the argillic horizon and the depth to the base of the argillic horizon range from 20 to 40 inches. The depth to carbonates ranges from 20 to 34 inches. The depth to the sandy substratum ranges from 60 to 80 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The Bt horizon and the Bt part of the B/E horizon have hue of 7.5YR, value of 4, and chroma of 3 or 4. They are silty clay loam or silt loam.

The E part of the B/E horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. It is very fine sandy loam or silt loam. Some pedons have an E or an E/B horizon.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is stratified silty clay, silty clay loam, silt loam, or very fine sandy loam.

The 2C horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. It is sand that has strata of silt loam or silty clay loam.

Leafriver Series

The Leafriver series consists of very poorly drained soils on outwash plains and lake plains. These soils formed in thin organic deposits overlying sandy sediments. Permeability is moderate or moderately rapid in the upper organic sediments and rapid in the sandy deposits. Slopes are 0 to 1 percent.

Taxonomic classification: Sandy, mixed, frigid Histic Humaquepts

Typical pedon of Leafriver muck, in an area of Tawas-Leafriver mucks; on a southeast-facing slope of 1 percent, in a forested area, at an elevation of 1,150 feet; 2,350 feet north and 400 feet east of the southwest corner of sec. 28, T. 24 N., R. 2 W., Higgins Township; USGS Roscommon South 7.5-minute topographic quadrangle; lat. 44 degrees 26 minutes 36.20 seconds N. and long. 84 degrees 34 minutes 15.54 seconds W.

Oa1—0 to 8 inches; muck, black (10YR 2/1) broken face and unrubbed; about 15 percent fiber, 7 percent rubbed; weak fine and medium granular structure; very friable; many very fine and fine, common medium, and few coarse roots; primarily woody fibers; about 15 percent woody fragments; very strongly acid; clear smooth boundary.

Oa2—8 to 10 inches; muck, black (10YR 2/1) broken face and unrubbed; about 8 percent fiber, 2 percent rubbed; weak medium subangular blocky structure parting to weak medium and coarse granular; very friable; many very fine and fine and few medium and coarse roots; primarily woody fibers; extremely acid; abrupt smooth boundary.

A—10 to 12 inches; very dark gray (2.5Y 3/1) loamy sand; weak medium and coarse subangular blocky structure; very friable; many very fine and fine and few medium and coarse roots; very strongly acid; abrupt wavy boundary.

C—12 to 20 inches; light olive brown (2.5Y 5/3) sand; single grain; loose; common very fine and fine roots; few distinct discontinuous olive brown (2.5Y 4/3) organic coatings on faces of peds; 2 percent gravel; extremely acid; clear wavy boundary.

Cg—20 to 80 inches; dark grayish brown (2.5Y 4/2) sand; single grain; loose; few coarse distinct olive brown (2.5Y 4/4) masses of iron accumulation; 2 percent gravel; extremely acid.

The thickness of the organic mantle ranges from 6 to 8 inches. The depth to the C horizon ranges from 8 to 15 inches.

The O horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 and chroma of 0 to 2.

The A horizon has hue of 10YR or 2.5Y or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3.

The C horizons have hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 3. The content of gravel ranges from 0 to 15 percent.

Loxley Series

The Loxley series consists of very poorly drained soils on lake plains, outwash plains, and kame moraines. These soils formed in herbaceous and woody deposits more than 51 inches thick. Permeability ranges from moderately slow to moderately rapid. Slopes range from 0 to 2 percent.

Taxonomic classification: Dysic, frigid Typic Haplosaprists

Typical pedon of Loxley peat, in an area of Dawson-Loxley peats; on a southwest-facing slope of 1 percent, in a forested area, at an elevation of 1,165 feet; 1,340 feet south and 1,615 feet east of the northwest corner of sec. 9, T. 23 N., R. 2 W., Higgins Township; USGS Roscommon South 7.5-minute topographic quadrangle; lat. 44 degrees 24 minutes 12.72 seconds N. and long. 84 degrees 34 minutes 05.30 seconds W.

Oi—0 to 6 inches; peat, dark brown (7.5YR 3/2) broken face, dark reddish brown (5YR 3/2) rubbed and pressed; about 85 percent fiber, 75 percent rubbed; weak very thick platy structure; very friable; many very fine, fine, and medium roots; primarily herbaceous fibers; extremely acid; abrupt smooth boundary.

Oa1—6 to 21 inches; muck, very dark brown (10YR 2/2) broken face and rubbed; about 10 percent fiber, 5 percent rubbed; weak fine subangular blocky structure; very friable; many very fine, fine, and medium roots; primarily herbaceous fibers; extremely acid; abrupt smooth boundary.

Oa2—21 to 29 inches; muck, black (10YR 2/1) broken face, very dark brown (10YR 2/2) rubbed; about 15 percent fiber, 4 percent rubbed; weak medium subangular blocky structure; friable; few very fine and fine roots; primarily herbaceous fibers; extremely acid; clear wavy boundary.

Oa3—29 to 80 inches; muck, black (10YR 2/1) broken face and rubbed; about 10 percent fiber, 3 percent rubbed; weak medium subangular blocky structure; very friable; few very fine and fine roots; primarily herbaceous fibers; extremely acid.

The thickness of the organic material ranges from 51 to more than 80 inches. The organic material is primarily composed of herbaceous material.

The surface tier has hue of 5YR to 10YR or is neutral in hue. It has value of 2 to 4 and chroma of 0 to 2. Some pedons have a layer of sphagnum moss as much as 12 inches thick above the Oi horizon.

The subsurface and bottom tiers have hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 or 2. They are dominantly muck, but some pedons have thin layers of mucky peat.

Lupton Series

The Lupton series consists of very poorly drained soils on lake plains, outwash plains, and moraines. These soils formed in herbaceous and woody deposits more than 51 inches thick. Permeability ranges from moderately slow to moderately rapid. Slopes range from 0 to 2 percent.

Taxonomic classification: Euic, frigid Typic Haplosaprists

Typical pedon of Lupton muck, in an area of Tawas-Lupton mucks; on an east-facing slope of 1 percent, in

a forested area, at an elevation of 1,165 feet; 125 feet north and 2,170 feet east of the southwest corner of sec. 14, T. 23 N., R. 2 W., Higgins Township; USGS Roscommon South 7.5-minute topographic quadrangle; lat. 44 degrees 22 minutes 40.87 seconds N. and long. 84 degrees 31 minutes 26.79 seconds W.

Oa1—0 to 5 inches; muck, black (10YR 2/1) broken face, black (5YR 2.5/1) rubbed; about 25 percent fiber, 13 percent rubbed; weak very thick platy structure; very friable; many very fine, fine, and medium roots and few coarse roots; primarily herbaceous fibers; moderately acid; abrupt smooth boundary.

Oa2—5 to 15 inches; muck, black (7.5YR 2.5/1) broken face, black (10YR 2/1) rubbed; about 15 percent fiber, 5 percent rubbed; weak fine subangular blocky structure; very friable; many very fine, fine, and medium roots and few coarse roots; primarily herbaceous fibers; moderately acid; abrupt smooth boundary.

Oa3—15 to 40 inches; muck, black (7.5YR 2.5/1) broken face, black (10YR 2/1) rubbed; about 10 percent fiber, 3 percent rubbed; weak medium subangular blocky structure; very friable; few very fine and fine roots; fibers are woody and herbaceous; 2 percent wood fragments; slightly acid; clear wavy boundary.

Oa4—40 to 80 inches; muck, black (7.5YR 2.5/1) broken face and rubbed; about 5 percent fiber, 2 percent rubbed; weak fine and medium subangular blocky structure; very friable; few very fine and fine roots; fibers are woody and herbaceous; 2 percent wood fragments; slightly acid.

The thickness of the organic material ranges from 51 to more than 80 inches. The organic material is primarily composed of herbaceous material, but some woody fragments are included.

The surface tier has hue of 5YR to 10YR or is neutral in hue. It has value of 2 to 3 and chroma of 0 to 2. It is dominantly muck, but the range includes mucky peat.

The subsurface and bottom tiers have hue of 7.5YR or 10YR or are neutral in hue. They have value of 2 to 3 and chroma of 0 to 3. They are dominantly muck, but some pedons have thin layers of mucky peat.

Menominee Series

The Menominee series consists of well drained soils on ground moraines and end moraines. These soils formed in sandy sediments underlain by loamy deposits. Permeability is rapid in the sandy material and moderately slow in the loamy material. Slopes range from 12 to 35 percent.

Taxonomic classification: Sandy over loamy, mixed, active, frigid Alfic Haplorthods

Typical pedon of Menominee sand, 12 to 18 percent slopes; on a northwest-facing slope of 16 percent, in a forested area, at an elevation of 910 feet; 300 feet north and 2,200 feet east of the southwest corner of sec. 30, T. 24 N., R. 5 E., Plainfield Township, Iosco County; USGS South Branch 7.5-minute topographic quadrangle; lat. 44 degrees 26 minutes 14 seconds N. and long. 83 degrees 52 minutes 34 seconds W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) sand, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many medium and fine and few coarse roots; extremely acid; clear smooth boundary.

E—4 to 7 inches; grayish brown (10YR 5/2) sand, very pale brown (10YR 8/2) dry; weak medium subangular blocky structure; very friable; many fine and medium and few coarse roots; extremely acid; clear smooth boundary.

Bs1—7 to 18 inches; dark brown (7.5YR 4/4) sand; weak medium subangular blocky structure; very friable; many fine and medium and few coarse roots; extremely acid; clear wavy boundary.

Bs2—18 to 23 inches; dark yellowish brown (10YR 4/6) sand; weak medium subangular blocky structure; very friable; many medium and few coarse roots; very strongly acid; clear wavy boundary.

2B/E—23 to 39 inches; 70 percent brown (7.5YR 5/4) clay loam (Bt); surrounded by light brownish gray (10YR 6/2) sandy loam (E), light gray (10YR 7/1) dry; strong medium angular blocky structure; firm; few fine roots; common distinct brown (7.5YR 5/4) clay films; strongly acid; clear wavy boundary.

2Bt—39 to 59 inches; reddish brown (5YR 4/4) clay loam; weak coarse subangular blocky structure; firm; few fine roots; common distinct reddish brown (5YR 4/4) clay films on faces of peds; neutral; clear wavy boundary.

2C—59 to 80 inches; brown (7.5YR 5/4) loam; massive; firm; very pale brown (10YR 8/2) carbonate coatings in cracks; slightly effervescent; moderately alkaline.

The thickness of the sand ranges from 20 to 40 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. Pedons in cultivated areas have an Ap horizon,

which has hue of 10YR and 7.5YR and value and chroma of 2 or 3.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 2 or 3. It is sand, fine sand, loamy sand, or loamy fine sand.

The Bs1 horizon has value and chroma of 3 or 4. It is sand or fine sand. The value and chroma of 3 do not occur together.

The Bs2 horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sand or fine sand.

Some pedons have an E´ horizon. This horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 2 to 4.

The E part of the 2B/E horizon has hue of 7.5YR or 10YR, value of 4 to 7 moist and 6 to 8 dry, and chroma of 2 or 3 moist and dry.

The Bt part of the 2B/E horizon and the 2Bt horizon have hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 3 to 6. They are clay loam or silty clay loam.

Some pedons have a 2BC horizon. This horizon, if it occurs, has the same colors and textures as those of the 2Bt horizon. The content of clay ranges from 18 to 35 percent.

The 2C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 6. It is clay loam, loam, or silty clay loam.

Morganlake Series

The Morganlake series consists of moderately well drained soils on moraines. These soils formed in sandy sediments over loamy deposits. Permeability is rapid in the upper sandy part and moderately slow in the lower loamy part. Slopes range from 0 to 12 percent.

Taxonomic classification: Sandy over loamy, mixed, active, frigid Alfic Oxyaquic Haplorthods

Typical pedon of Morganlake sand (fig. 17), 0 to 6 percent slopes; on a south-facing slope of 2 percent, in a forested area, at an elevation of 950 feet; 1,920 feet north and 303 feet east of the southwest corner of sec. 34, T. 21 N., R. 1 W., Nester Township; USGS Butman 7.5-minute topographic quadrangle; lat. 44 degrees 10 minutes 01.76 seconds N. and long. 84 degrees 25 minutes 36.63 seconds W.

A—0 to 2 inches; dark brown (7.5YR 3/2) sand, gray (7.5YR 5/1) dry; weak fine and medium granular structure; very friable; many very fine and fine and few medium and coarse roots; neutral; abrupt wavy boundary.

E1—2 to 8 inches; brown (10YR 5/3) and light brownish gray (10YR 6/2) sand, very pale brown (10YR 7/3) and light gray (10YR 7/2) dry; weak

Figure 17.—Profile of Morganlake sand. This soil is sandy in the upper part and loamy in the lower part. Depth is marked in inches.

fine and medium subangular blocky structure; very friable; many very fine and fine and few medium and coarse roots; moderately acid; clear wavy boundary.

E2—8 to 13 inches; brown (10YR 4/3) sand, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; very friable; common fine and medium and few coarse roots; strongly acid; clear wavy boundary.

Bs1—13 to 17 inches; brown (7.5YR 4/4) sand; weak fine and medium subangular blocky structure parting to weak medium granular; very friable; common fine and medium roots; moderately acid; clear wavy boundary.

Bs2—17 to 24 inches; dark brown (7.5YR 3/4) sand; single grain; loose; common fine and medium roots; moderately acid; abrupt irregular boundary.

Bs3—24 to 25 inches; brown (7.5YR 4/4) loamy sand;

weak fine granular structure parting to single grain; very friable; common fine and medium roots; moderately acid; abrupt irregular boundary.

2Bt1—25 to 28 inches; brown (7.5YR 5/4) clay loam; strong medium subangular blocky structure parting to strong fine angular blocky; very firm; few fine and medium roots; common discontinuous faint brown (7.5YR 5/4) clay coatings on faces of peds; 3 percent gravel; moderately acid; clear wavy boundary.

2Bt2—28 to 37 inches; brown (7.5YR 4/4) clay loam; strong medium angular blocky structure parting to strong fine angular blocky; very firm; few fine and medium roots; many continuous distinct reddish brown (5YR 4/4) clay coatings on faces of peds; neutral; clear wavy boundary.

2C—37 to 80 inches; brown (7.5YR 5/4) clay loam; massive; firm; strongly effervescent; moderately alkaline.

The depth to loamy till ranges from 20 to 38 inches. The content of gravel ranges from 0 to 5 percent throughout the profile. The depth to carbonates ranges from 37 to more than 60 inches. Saturation occurs within a depth of 40 inches.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2.

The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 or 3.

The Bs1 and Bs2 horizons have hue of 7.5YR, value of 3 or 4, and chroma of 4.

The Bs3 horizon has hue of 7.5YR, value of 3 to 5, and chroma of 4.

The 2Bt horizon has hue of 7.5YR and value and chroma of 4 to 6. It is clay loam or silty clay loam.

The 2C horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4.

Nester Series

The Nester series consists of moderately well drained soils on ground moraines and end moraines. These soils formed in loamy deposits. Permeability is slow. Slopes range from 1 to 12 percent.

Taxonomic classification: Fine, mixed, semiactive, frigid Oxyaquic Glossudalfs

Typical pedon of Nester sandy loam, 6 to 12 percent slopes; on a northwest-facing slope of 9 percent, in an open area of idle land, at an elevation of 925 feet; 1,770 feet north and 1,365 feet west of the southeast corner of sec. 34, T. 21 N., R. 1 W., Nester Township; USGS Butman 7.5-minute topographic quadrangle; lat. 44 degrees 09 minutes 50.31 seconds N. and long. 84 degrees 24 minutes 41.69 seconds W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) sandy loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure parting to strong fine and medium granular; friable; many very fine and fine and common medium roots; 3 percent gravel; slightly acid; abrupt smooth boundary.

E—7 to 9 inches; brown (10YR 5/3) sandy loam, yellowish brown (10YR 5/6) dry; moderate medium subangular blocky structure; friable; many very fine and fine roots; common very dark grayish brown (10YR 3/2) worm channels; 3 percent gravel; slightly acid; clear wavy boundary.

B/E—9 to 12 inches; about 90 percent strong brown (7.5YR 4/6) clay loam (Bt); surrounding columns of pale brown (10YR 6/3) sandy loam (E), very pale brown (10YR 8/2) dry; strong fine and medium subangular blocky structure; many very fine and common fine roots; common discontinuous prominent yellowish brown (10YR 5/4) clay coatings on faces of peds; 3 percent gravel; moderately acid; clear wavy boundary.

Bt1—12 to 18 inches; brown (7.5YR 4/4) clay loam; strong medium and coarse angular blocky structure; very firm; common very fine and few fine roots; common continuous brown (7.5YR 5/4) clay coatings on faces of peds; 3 percent gravel; moderately acid; clear wavy boundary.

Bt2—18 to 33 inches; brown (7.5YR 5/4) clay loam; strong coarse angular blocky structure; very firm; few very fine roots; common discontinuous brown (7.5YR 5/4) clay coatings on faces of peds; few fine prominent red (2.5YR 4/8) and yellowish red (5YR 5/8) iron accumulations in the lower part; 4 percent gravel; slightly acid; clear wavy boundary.

C1—33 to 42 inches; light brown (7.5YR 6/4) clay loam; moderate medium subangular blocky structure; firm; few very fine roots; few fine prominent yellowish red (5YR 5/6) iron accumulations; 4 percent gravel; slightly effervescent; moderately alkaline; clear wavy boundary.

C2—42 to 80 inches; brown (7.5YR 5/4) clay loam; moderate medium and fine subangular structure; firm; common continuous prominent light gray (10YR 7/2) silt coatings on vertical faces of peds; strongly effervescent; moderately alkaline.

The depth to the base of the argillic horizon ranges from 24 to 38 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3.

The E horizon and the E part of the B/E horizon

have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3. The texture is sandy loam or loam.

The Bt horizon and the Bt part of the B/E horizon have hue of 7.5YR, value of 3 to 6, and chroma of 4 to 6.

The C horizon has hue of 7.5YR, value of 4 to 6, and chroma of 4 or 5.

Otisco Series

The Otisco series consists of somewhat poorly drained soils on outwash plains and lake plains. These soils formed in sandy sediments. Permeability is moderately rapid. Slopes range from 0 to 3 percent.

Taxonomic classification: Sandy, mixed, frigid Argic Endoaquods

Typical pedon of Otisco sand (fig. 18), 0 to 3 percent slopes; on a northwest-facing slope of 2 percent, in a forested area, at an elevation of 1,148 feet; 2,450 feet north and 1,250 feet west of the southeast corner of sec. 21, T. 23 N., R. 3 W., Markey Township; USGS Prudenville 7.5-minute topographic quadrangle; lat. 44 degrees 22 minutes 09.84 seconds N. and long. 84 degrees 40 minutes 44.20 seconds W.

Oe—0 to 1 inch; reddish black (2.5YR 2.5/1), partially decomposed forest litter.

A—1 to 3 inches; black (5YR 2.5/1) sand, dark gray (7.5YR 4/1) dry; moderate fine and medium granular structure; very friable; many very fine, fine, and medium roots and common coarse roots; about 15 percent light brownish gray (10YR 6/2) sand grains; extremely acid; 1 percent gravel; abrupt wavy boundary.

E—3 to 12 inches; light brownish gray (10YR 6/2) sand, light gray (10YR 7/2) dry; weak fine and medium subangular blocky structure; very friable; many very fine and fine and common coarse roots; 2 percent gravel; extremely acid; abrupt wavy boundary.

Bhs—12 to 15 inches; dark reddish brown (2.5YR 2.5/3) sand; strong medium and coarse subangular blocky structure; friable; many very fine, common fine, and few coarse roots; weakly to strongly cemented strong brown (7.5YR 4/6) and reddish black (2.5YR 2.5/1) ortstein; ortstein occupies 49 percent of the horizon; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; 1 percent gravel; very strongly acid; abrupt wavy boundary.

Bs—15 to 20 inches; yellowish brown (10YR 5/6) sand; weak fine and medium subangular blocky structure; very friable; common very fine and fine and few medium and coarse roots; common coarse prominent dark red (2.5YR 3/6), common medium and coarse prominent yellowish red (5YR 4/6), and many medium and coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; 1 percent gravel; strongly acid; clear wavy boundary.

Figure 18.—Profile of Otisco sand. Thin lamellae are in the lower part of the subsoil. Depth is marked in inches.

E´—20 to 27 inches; light yellowish brown (10YR 6/4) sand, very pale brown (10YR 7/3) dry; weak medium subangular blocky structure; very friable; few very fine, fine, and medium roots; common medium and coarse prominent reddish brown (5YR 4/4), many medium and coarse distinct brownish yellow (10YR 6/6), and common medium and coarse prominent yellowish red (5YR 4/6) masses of iron accumulation; 1 percent gravel; moderately acid; clear wavy boundary.

E/B—27 to 36 inches; about 65 percent light yellowish brown (10YR 6/4) sand (E), very pale brown

(10YR 8/2) dry; weak fine and medium subangular blocky structure; very friable; surrounding peds of brown (7.5YR 4/4) loamy sand (Bt); weak medium subangular blocky structure parting to weak fine subangular blocky; friable; few very fine and fine roots; common distinct continuous clay films throughout; common medium and coarse prominent strong brown (7.5YR 5/8) and common medium prominent yellowish red (5YR 5/6) masses of iron accumulation; 1 percent gravel; strongly acid; gradual wavy boundary.

B/E—36 to 55 inches; yellowish brown (10YR 5/4) sandy loam and loamy sand (Bt); surrounded by light gray (5Y 7/2) sand (E), light gray (2.5Y 7/2) dry; moderate medium and coarse subangular blocky structure; friable; common faint discontinuous clay bridging between sand grains; many medium and coarse prominent yellowish red (5YR 5/8) and many coarse prominent reddish yellow (7.5YR 6/8) masses of iron accumulation; common medium prominent light gray (10YR 7/1) iron depletions; 1 percent gravel; strongly acid; gradual wavy boundary.

C—55 to 80 inches; brown (10YR 5/3) sand; single grain; loose; lenses of light brownish gray (10YR 6/2) loamy sand 1/2 to 1 inch thick in the upper 6 inches of the horizon; common medium prominent yellowish brown (10YR 5/8) and common coarse prominent yellowish red (5YR 5/8) masses of iron accumulation; 3 percent gravel; slightly acid.

The depth to the base of the argillic material ranges from 48 to more than 60 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The A horizon has hue 5YR to 10YR, value or 2 or 3, and chroma of 1.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2.

The Bhs horizon has hue of 2.5YR to 7.5YR and value and chroma of 2 or 3.

The Bs horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 4 to 6. The texture is sand or loamy sand.

The E´ horizon and the E part of the E/B and B/E horizons have hue of 5YR to 10YR, value of 6, and chroma of 3 or 4.

The Bt part of the E/B and B/E horizons has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. Some pedons have lamellae 1/8 inch to 2 inches thick. The Bt part of these horizons is sandy loam or loamy sand.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. It is sand or loamy sand.

Perecheney Series

The Perecheney series consists of moderately well drained soils on lake plains and outwash plains. These soils formed in sandy sediments underlain by loamy and sandy deposits. Permeability is rapid in the sandy material and moderately slow in the loamy material. Slopes range from 0 to 12 percent.

Taxonomic classification: Fine-loamy, mixed, active, frigid Oxyaquic Glossudalfs

Typical pedon of Perecheney sand, 0 to 6 percent slopes; on a north-facing slope of 1 percent, in a forested area, at an elevation of 1,159 feet; 675 feet south and 200 feet east of the northwest corner of sec. 7, T. 23 N., R. 3 W., Markey Township; USGS Lyon Manor 7.5-minute topographic quadrangle; lat. 44 degrees 24 minutes 17.23 seconds N. and long. 84 degrees 44 minutes 05.40 seconds W.

Oe—0 to 2 inches; dark brown (7.5YR 3/2), partially decomposed forest litter.

A—2 to 3 inches; black (7.5YR 2.5/1) sand, very dark gray (7.5YR 3/1) dry; weak fine subangular blocky structure parting to weak fine granular; very friable; many very fine, fine, and medium roots; 2 percent gravel; strongly acid; abrupt wavy boundary.

E—3 to 5 inches; grayish brown (10YR 5/2) sand, light gray (10YR 7/2) dry; weak fine subangular blocky structure; very friable; many very fine and fine and common medium and coarse roots; 2 percent gravel; very strongly acid; abrupt wavy boundary.

Bw1—5 to 16 inches; strong brown (7.5YR 4/6) sand; weak fine subangular blocky structure; very friable; common very fine, fine, and medium roots and few coarse roots; 2 percent gravel; strongly acid; gradual wavy boundary.

Bw2—16 to 28 inches; strong brown (7.5YR 5/6) sand; weak fine and medium subangular blocky structure; very friable; common very fine and fine and few medium and coarse roots; 3 percent gravel; moderately acid; clear wavy boundary.

2B/E—28 to 34 inches; about 60 percent brown (10YR 4/3) loam (Bt); moderate medium and coarse subangular blocky structure; firm; surrounded by light brownish gray (10YR 6/2) loamy sand (E), light gray (10YR 7/2) dry; weak fine subangular blocky structure; friable; few very fine, fine, and medium roots; many very fine tubular pores; common medium distinct yellow (10YR 7/6) masses of iron accumulation; 4 percent gravel; strongly acid; clear wavy boundary.

2Bt1—34 to 46 inches; brown (7.5YR 4/3) clay loam;

moderate coarse subangular blocky structure; very firm; common very fine and fine and few medium roots; many prominent discontinuous dark yellowish brown (10YR 3/4) clay films on faces of peds and in pores; common fine faint brown (7.5YR 4/4) masses of iron accumulation; 5 percent gravel; neutral; gradual wavy boundary.

2Bt2—46 to 71 inches; brown (10YR 4/3) loam; moderate medium subangular blocky structure; very firm; common very fine, fine, and medium roots; many prominent discontinuous dark yellowish brown (10YR 3/4) clay films on faces of peds and in pores; common prominent discontinuous light yellowish brown (10YR 6/4) carbonate coatings throughout; 7 percent gravel; violently effervescent; moderately alkaline; abrupt wavy boundary.

3E and Bt—71 to 80 inches; light yellowish brown (10YR 6/4) sand, very pale brown (10YR 7/3) dry (E); single grain; loose; lamellae of brown (7.5YR 5/4 and 4/4) loamy sand (Bt); weak fine subangular blocky structure; friable; 2 percent gravel; slightly alkaline.

The depth to the base of the argillic horizon ranges from 67 to more than 80 inches. The content of gravel ranges from 0 to 10 percent throughout the profile. The depth to carbonates ranges from 46 to more than 80 inches.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 3, and chroma of 1 or 2.

The E horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 2 or 3.

The Bw horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6.

The E part of the 2B/E horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 2 to 4. It is sand or loamy sand. Some pedons have a separate E horizon. The 2Bt horizon and the Bt part of the 2B/E horizon have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The texture is loam or clay loam.

The E part of the 3E and Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 to 5. It is sand or loamy sand. The Bt part of the 3E and Bt horizon consists of lamellae of loamy sand or sandy loam 1/4 inch to 2 inches thick. It has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6.

Pinewood Series

The Pinewood series consists of somewhat poorly drained soils on collapsed lake plains. These soils formed in loamy deposits underlain by sandy sediments. Permeability is slow in the clayey material and rapid in the sandy material. Slopes range from 0 to 2 percent.

Taxonomic classification: Fine, mixed, semiactive, frigid Aquic Glossudalfs

Typical pedon of Pinewood sandy loam (fig. 19), 0 to 2 percent slopes; on a north-facing slope of 1 percent, in an open area of idle land, at an elevation of 1,178 feet; 425 feet north and 250 feet west of the southeast corner of sec. 4, T. 24 N., R. 1 W., Au Sable Township; USGS St. Helen NW 7.5-minute topographic quadrangle; lat. 44 degrees 29 minutes

Figure 19.—Profile of Pinewood sand. This soil has a loamy surface layer and subsoil and a sandy substratum. Depth is marked in inches.

45.38 seconds N. and long. 84 degrees 25 minutes 54.37 seconds W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) sandy loam, gray (10YR 5/1) dry; moderate fine and medium subangular blocky structure parting to moderate fine granular; very friable; many very fine and common fine and medium roots; 4 percent gravel; very strongly acid; abrupt wavy boundary.

B/E—8 to 14 inches; about 70 percent brown (7.5YR 4/4) clay (Bt); surrounded by light brownish gray (10YR 6/2) sandy loam (E), light gray (10YR 7/2) dry; moderate medium and coarse subangular blocky structure parting to strong fine and medium subangular blocky; firm; many very fine and fine and common medium roots; common very fine tubular pores; common distinct discontinuous brown (7.5YR 4/3) and few distinct discontinuous brown (7.5YR 5/3) clay films on vertical and horizontal faces of peds; 2 percent very dark grayish brown (10YR 3/2) wormcasts extending 3 inches down into the horizon; common fine and medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; 4 percent gravel; strongly acid; clear wavy boundary.

Bt1—14 to 26 inches; brown (10YR 4/3) clay; moderate coarse prismatic structure parting to strong medium and coarse subangular blocky; firm; many very fine and common fine roots; many very fine and fine tubular pores; many prominent continuous brown (10YR 4/3) and common distinct discontinuous dark brown (7.5YR 3/3) clay films on vertical and horizontal faces of peds; many fine and medium prominent strong brown (7.5YR 5/6) and common medium and coarse prominent yellowish red (5YR 5/8) masses of iron accumulation; few fine prominent light greenish gray (5GY 7/1) iron depletions; 5 percent gravel; slightly acid; abrupt wavy boundary.

Bt2—26 to 41 inches; 65 percent brown (10YR 4/3) silty clay and 35 percent brownish yellow (10YR 6/6) fine sandy loam; moderate coarse subangular blocky structure parting to weak fine and medium subangular blocky; firm; common very fine and few fine roots; many very fine and fine tubular pores; common distinct discontinuous brown (10YR 4/3) and few distinct discontinuous dark grayish brown (10YR 4/2) clay films on horizontal faces of peds; many coarse prominent yellowish brown (10YR 5/6) and common fine prominent yellowish red (5YR 5/8) masses of iron accumulation; 2 percent gravel; slightly acid; clear wavy boundary.

Bt3—41 to 45 inches; brown (10YR 5/3) silty clay; moderate coarse subangular blocky structure; firm; common very fine and few fine roots; many very fine and fine tubular pores; many prominent continuous dark yellowish brown (10YR 4/4) clay films on vertical and horizontal faces of peds and few prominent discontinuous very pale brown (10YR 7/3) carbonate coatings in root channels and pores; common fine and medium distinct yellowish brown (10YR 5/6) and common fine prominent yellowish red (5YR 4/6) masses of iron accumulation; 5 percent gravel; violently effervescent; neutral; abrupt wavy boundary.

2C1—45 to 58 inches; strong brown (7.5YR 4/6) sand; weak medium and coarse subangular blocky structure; very friable; common very fine and few fine roots; a layer of brown (7.5YR 4/4) sandy clay loam 1 1/2 inches thick occurs along the boundary with the Bt3 horizon; few fine distinct yellowish red (5YR 4/6) and common fine and medium faint strong brown (7.5YR 5/6) masses of iron accumulation; 3 percent gravel; neutral; gradual wavy boundary.

2C2—58 to 67 inches; yellowish brown (10YR 5/6) sand; weak medium and coarse subangular blocky structure parting to single grain; very friable; few very fine roots; 3 percent gravel; neutral; gradual wavy boundary.

2C3—67 to 80 inches; yellowish brown (10YR 5/4) sand; weak medium and coarse subangular blocky structure parting to single grain; very friable; few very fine roots throughout; 3 percent gravel; strongly effervescent; moderately alkaline.

The depth to the base of the argillic material ranges from 40 to 60 inches. The content of gravel ranges from 0 to 5 percent in the clayey part and from 0 to 10 percent in the sandy horizons. The depth to carbonates ranges from 16 to more than 45 inches.

The Ap horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. Pedons in uncultivated areas have an A horizon, which is 1 to 3 inches thick. This horizon has hue of 5YR to 10YR, value of 2, and chroma of 1 or 2.

The E horizon, if it occurs, and the E part of the B/E horizon have hue of 7.5YR or 10YR, value of 6 or 7, and chroma of 2 or 3. The texture is loam, sandy loam, or loamy fine sand.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. The texture is clay loam, silty clay loam, silty clay, or clay. Some pedons have thin lenses of loamy fine sand and fine sandy loam.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is dominantly sand, but the range includes loamy sand or thin strata of loamy sand.

Proper Series

The Proper series consists of moderately well drained soils on beach ridges and dunes. These soils formed in sandy sediments. Permeability is rapid. Slopes range from 0 to 6 percent.

Taxonomic classification: Sandy, mixed, frigid, ortstein Oxyaquic Haplorthods

Typical pedon of Proper sand, in an area of Proper-Finch-Deford complex, 0 to 6 percent slopes; on a west-facing slope of 1 percent, in a forested area, at an elevation of 1,147 feet; 2,080 feet south and 120 feet east of the northwest corner of sec. 17, T. 22 N., R. 4 W., Roscommon Township; USGS Houghton Lake 7.5-minute topographic quadrangle; lat. 44 degrees 18 minutes 00.75 seconds N. and long. 84 degrees 48 minutes 48.77 seconds W.

Oe—0 to 2 inches; black (10YR 2/1), partially decomposed forest litter.

A—2 to 4 inches; black (10YR 2/1) sand, dark gray (10YR 4/1) dry; moderate medium granular structure; very friable; very strongly acid; abrupt smooth boundary.

E1—4 to 6 inches; light brownish gray (10YR 6/2) sand, pale brown (10YR 6/3) dry; weak medium granular structure; very friable; strongly acid; abrupt smooth boundary.

E2—6 to 11 inches; light gray (10YR 7/2) sand, very pale brown (10YR 8/2) dry; weak medium granular structure; very friable; strongly acid; abrupt wavy boundary.

Bhs—11 to 12 inches; dark reddish brown (5YR 3/3) sand; moderate medium subangular blocky structure parting to moderate medium platy; firm or very firm; weakly to strongly cemented ortstein; ortstein occupies 25 percent of the horizon; strongly acid; abrupt broken boundary.

Bs1—12 to 15 inches; yellowish red (5YR 4/6) sand; moderate medium platy structure; firm to extremely firm; columns of moderately to very strongly cemented ortstein extend into the Bs2 horizon; ortstein occupies 50 to 55 percent of the horizon; moderately acid; clear wavy boundary.

Bs2—15 to 23 inches; strong brown (7.5YR 5/6) sand; moderate medium subangular blocky structure; firm or very firm; columns of firmly or very firmly cemented ortstein extend into the Bs3 horizon; ortstein occupies 45 to 55 percent of the horizon; moderately acid; gradual irregular boundary.

Bs3—23 to 37 inches; yellowish brown (10YR 5/6) sand; single grain; firm to loose; columns of weakly or moderately cemented ortstein; ortstein occupies 15 to 35 percent of the horizon; common medium distinct yellowish brown (10YR 5/8) soft masses of iron accumulation; moderately acid; clear wavy boundary.

C—37 to 47 inches; light yellowish brown (10YR 6/4) sand; single grain; firm to loose; common coarse faint pale brown (10YR 6/3) and common fine distinct yellowish brown (10YR 5/6) soft masses of iron accumulation; columns of weakly to moderately cemented ortstein; ortstein occupies 35 to 45 percent of the horizon; moderately acid; gradual wavy boundary.

Cg—47 to 80 inches; light gray (10YR 7/2) sand; single grain; loose; moderately acid.

The depth to the C horizon ranges from 32 to 40 inches. The depth to ortstein ranges from 12 to 15 inches. Ortstein makes up 25 to 55 percent of the Bs horizons, and at least one horizon contains more than 50 percent ortstein. The content of gravel ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1.

The E horizon has hue of 5YR to 10YR, value of 5 to 7, and chroma of 2.

The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3.

The Bs horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 5 or 6.

The C horizon has hue of 10YR, value of 5 to 7, and chroma of 2 to 4.

Rubicon Series

The Rubicon series consists of excessively drained soils on outwash plains, lake plains, moraines, and beach ridges. These soils formed in sandy sediments. Permeability is rapid. Slopes range from 0 to 35 percent.

Taxonomic classification: Sandy, mixed, frigid Entic Haplorthods

Typical pedon of Rubicon sand (fig. 20), 0 to 6 percent slopes; on a northwest-facing slope of 3 percent, in a forested area, at an elevation of 1,125 feet; 2,220 feet west and 550 feet north of the southeast corner of sec. 25, T. 21 N., R. 4 W., Roscommon Township; USGS Meredith NW 7.5-minute topographic quadrangle; lat. 44 degrees 10 minutes 36.47 seconds N. long. 84 degrees 44 minutes 21.48 seconds W.

Oe—0 to 1 inch; dark brown (7.5YR 3/2), partially decomposed forest litter.

A—1 to 3 inches; very dark gray (7.5YR 3/1) sand, dark gray (7.5YR 4/1) dry; weak medium granular structure; very friable; many very fine and

Figure 20.—Profile of Rubicon sand. This soil is brown and dark brown in the upper part of the subsoil. Depth is marked in inches.

common fine and medium roots; 1 percent gravel; strongly acid; abrupt wavy boundary.

E—3 to 7 inches; brown (7.5YR 5/2) sand, pinkish gray (7.5YR 6/2) dry; weak medium granular structure; very friable; common fine and medium roots; 1 percent gravel; strongly acid; abrupt wavy boundary.

Bs1—7 to 11 inches; 75 percent brown (7.5YR 4/4) and 25 percent dark brown (7.5YR 3/4) sand; moderate medium subangular blocky structure parting to weak very fine subangular blocky; very friable; common fine and medium roots; 1 percent gravel; strongly acid; clear wavy boundary.

Bs2—11 to 14 inches; strong brown (7.5YR 4/6) sand; weak medium subangular blocky structure parting to weak fine subangular blocky; very friable; common fine and medium roots; 1 percent gravel; moderately acid; clear wavy boundary.

Bs3—14 to 21 inches; dark yellowish brown (10YR 4/6) sand; weak coarse subangular blocky structure parting to weak fine subangular blocky; very friable; common fine and medium roots; 1 percent gravel; moderately acid; clear wavy boundary.

BC—21 to 31 inches; brownish yellow (10YR 6/6) sand; single grain; loose; common fine roots; 1 percent gravel; moderately acid; gradual wavy boundary.

C—31 to 80 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; 1 percent gravel; moderately acid.

The depth to the C horizon ranges from 28 to 38 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 1 or 2.

The E horizon has hue of 7.5YR, value of 4 to 6, and chroma of 1 to 3.

The Bs1 horizon has hue of 7.5YR, value of 3 or 4, and chroma of 4.

The Bs2 and Bs3 horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

The BC horizon has hue of 7.5YR or 10YR and value and chroma of 5 or 6.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. Some pedons have thin color bands below a depth of 80 inches.

Sims Series

The Sims series consists of very poorly drained soils on ground moraines and end moraines. These soils formed in loamy deposits. Permeability is slow. Slopes range from 0 to 2 percent.

Taxonomic classification: Fine, mixed, semiactive, nonacid, frigid Mollic Epiaquepts

Typical pedon of Sims loam; on a north-facing slope of 1 percent, in an open area of idle land, at an elevation of 925 feet; 375 feet north and 1,515 feet west of the southeast corner of sec. 34, T. 21 N., R. 1 W., Nester Township; USGS Butman 7.5-minute

topographic quadrangle; lat. 44 degrees 09 minutes 39.15 seconds N. and long. 84 degrees 24 minutes 32.89 seconds W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) loam, dark brown (10YR 3/3) dry; strong fine subangular blocky structure parting to strong fine granular; friable; many very fine and common medium roots; few fine prominent strong brown (7.5YR 5/8) masses of iron accumulation; 2 percent gravel; neutral; abrupt smooth boundary.

Bt—9 to 15 inches; brown (10YR 5/3) clay loam; strong fine subangular blocky structure; firm; many very fine and fine and few medium roots; common discontinuous distinct gray (10YR 5/1) clay coatings on faces of peds; many medium distinct yellowish brown (10YR 5/6) and many medium prominent strong brown (7.5YR 5/6) iron accumulations; common medium prominent gray (10YR 6/1) iron depletions; 2 percent gravel; neutral; clear wavy boundary.

Btg—15 to 36 inches; grayish brown (10YR 5/2) clay loam; strong fine subangular blocky structure; firm; few very fine and fine roots; common discontinuous faint gray (10YR 5/1) clay coatings on faces of peds; many medium prominent yellowish brown (10YR 5/6) iron accumulations; common medium prominent gray (5YR 5/1) iron depletions; 2 percent gravel; slightly effervescent; moderately alkaline; clear wavy boundary.

BCg1—36 to 45 inches; light brownish gray (10YR 6/2) clay loam; strong fine subangular blocky structure; firm; common discontinuous distinct gray (10YR 5/1) clay coatings on faces of peds; many medium prominent yellowish brown (10YR 5/6) iron accumulations; common medium prominent gray (N 6/0) iron depletions; 2 percent gravel; slightly effervescent; moderately alkaline; clear wavy boundary.

BCg2—45 to 51 inches; light brownish gray (10YR 6/2) clay loam; strong fine subangular blocky structure; firm; common continuous prominent pinkish white (5YR 8/2) carbonate coatings on vertical faces of peds; common continuous prominent greenish gray (5GY 6/1) silt coatings on faces of peds; common medium prominent reddish yellow (7.5YR 6/8) iron accumulations; common medium prominent greenish gray (5GY 6/1) iron depletions; effervescent; moderately alkaline; clear wavy boundary.

Cg—51 to 80 inches; light gray (10YR 7/2) clay loam; strong medium and coarse subangular blocky structure; firm; common continuous prominent pinkish white (5YR 8/2) carbonate coatings on vertical faces of peds; common medium prominent reddish yellow (7.5YR 6/8) iron accumulations; common fine and medium prominent white (5Y 8/1) iron depletions; strongly effervescent; moderately alkaline.

The content of gravel ranges from 0 to 3 percent throughout the profile. The depth to carbonates ranges from 15 to more than 40 inches.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3. It is clay loam, silty clay loam, or silty clay.

The Btg horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2.

The BCg horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 or 2.

The Cg horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 1 or 2.

Tawas Series

The Tawas series consists of very poorly drained soils on lake plains, outwash plains, and ground moraines. These soils formed in herbaceous and woody deposits 16 to 51 inches thick over sandy sediments. Permeability is moderately slow to moderately rapid in the upper organic material and rapid in the lower sandy material. Slopes range from 0 to 2 percent.

Taxonomic classification: Sandy or sandy-skeletal, mixed, euic, frigid Terric Haplosaprists

Typical pedon of Tawas muck, in an area of Tawas-Lupton mucks; on a south-facing slope of 1 percent, in a forested area, at an elevation of 1,175 feet; 75 feet south and 202 feet east of the northwest corner of sec. 13, T. 23 N., R. 1 W., Richfield Township; USGS St. Helen NW 7.5-minute topographic quadrangle; lat. 44 degrees 23 minutes 33.42 seconds N. and long. 84 degrees 23 minutes 21.80 seconds W.

Oa1—0 to 4 inches; muck, very dark brown (10YR 2/2) broken face, dark brown (10YR 3/3) rubbed; about 16 percent fiber, 4 percent rubbed; weak medium subangular blocky structure; many very fine, fine, and medium roots; primarily herbaceous fibers; slightly acid; clear wavy boundary.

Oa2—4 to 15 inches; muck, black (5YR 2.5/1) broken face, dark reddish brown (5YR 3/2) rubbed; about 7 percent fiber, 2 percent rubbed; weak fine and medium subangular blocky structure; many very fine and fine roots; fibers are woody and herbaceous; slightly acid; clear wavy boundary.

Oa3—15 to 21 inches; muck, very dark brown (10YR 2/2) broken face and rubbed; about 20 percent

fiber, 1 percent rubbed; weak medium and coarse subangular blocky structure; few very fine and fine roots; fibers are woody and herbaceous; slightly acid; clear wavy boundary.

Oa4—21 to 24 inches; muck, black (10YR 2/1) broken faced and rubbed; about 10 percent fiber, 5 percent rubbed; weak fine subangular blocky structure; fibers are woody and herbaceous; about 10 percent mineral material; slightly acid; abrupt smooth boundary.

C—24 to 80 inches; brown (10YR 4/3) (uncoated sand grain) sand; single grain; loose; slightly acid.

The organic material is primarily woody. The thickness of the organic layers ranges from 16 to 51 inches.

The surface tier has hue of 5YR to 10YR or is neutral in hue. It has value of 2 to 3 and chroma of 0 to 2.

The subsurface and bottom tiers have hue of 5YR to 10YR or are neutral in hue. They have value of 2 to 4 and chroma of 0 to 4. They are dominantly muck, but some pedons have thin layers of mucky peat.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 1 to 6. It is dominantly sand, but the range includes fine sand and individual strata of gravelly sand. The content of gravel ranges from 0 to 20 percent.

Udipsamments

Udipsamments consist of well drained to excessively drained, rapidly permeable soils on outwash plains, lake plains, moraines, and beach ridges. These soils formed in sand. Slopes range from 0 to 35 percent.

Typical pedon of Udipsamments, nearly level and undulating; on a north-facing slope of 1 percent, in a borrow area, at an elevation of 1,340 feet; 1,060 feet north and 380 feet west of the southeast corner of sec. 10, T. 22 N., R. 2 W., Backus Township; USGS St.Helen 7.5-minute topographic quadrangle; lat. 44 degrees 18 minutes 28.15 seconds N. and long. 84 degrees 24 minutes 40.36 seconds W.

C1—0 to 11 inches; brown (10YR 4/3) sand, pale brown (10YR 6/3) dry; single grain; loose; few very fine and fine roots; slightly alkaline; clear wavy boundary.

C2—11 to 47 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; moderately alkaline; clear wavy boundary.

C3—47 to 80 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; slightly alkaline.

These soils are on the bottom and sides of borrow pits or in areas of sandy cut and filled land. They have hue of 10YR or 7.5YR, value of 3 to 7, and chroma of 2 to 6. They are sand or loamy sand.

Udorthents

Udorthents consist of well drained and moderately well drained soils on moraines and lake plains. These soils formed in loamy material. Permeability is moderate or slow. Slopes range from 0 to 6 percent.

Typical pedon of Udorthents, loamy, nearly level and undulating; on a west-facing slope of 4 percent, in a borrow area, at an elevation of 1,160 feet; 2,570 feet north and 1,800 feet east of the southwest corner of sec. 7, T. 23 N., R. 3 W., Markey Township; USGS Lyon Manor 7.5-minute topographic quadrangle; lat. 44 degrees 23 minutes 56.46 seconds N. and long. 84 degrees 43 minutes 43.39 seconds W.

C—0 to 11 inches; brown (7.5YR 4/4) clay loam, brown (7.5YR 5/3) dry; strong fine subangular blocky structure; firm; slightly alkaline; clear wavy boundary.

B—11 to 24 inches; brown (7.5YR 4/3) clay loam; strong fine angular blocky structure; firm; many medium strong brown (7.5YR 5/6) masses of iron accumulation; slightly alkaline; clear wavy boundary.

BC—24 to 31 inches; brown (7.5YR 5/4) clay loam; strong medium angular blocky structure; very firm; many medium strong brown (7.5YR 5/6) masses of iron accumulation; many medium greenish gray (5GY 6/1) iron depletions; moderately alkaline; gradual wavy boundary.

C´—31 to 80 inches; brown (7.5YR 5/3) clay loam; strong medium and coarse angular blocky structure; very firm; many medium strong brown (7.5YR 5/6) masses of iron accumulation; many medium greenish gray (10GY 6/1) iron depletions; moderately alkaline.

These soils are on the bottom and sides of borrow pits or in areas of loamy filled land. They have hue of 5YR, 7.5YR, or 10YR, value of 4 to 7, and chroma of 3 to 6. The texture ranges from sandy loam to clay.

Wakeley Series

The Wakeley series consists of very poorly drained soils on outwash plains and lake plains. These soils formed in sandy sediments overlying loamy deposits. Permeability is rapid in the sandy material and slow in the loamy material. Slopes range from 0 to 2 percent.

Taxonomic classification: Sandy over clayey, mixed, semiactive, nonacid, frigid Aeric Epiaquents

Typical pedon of Wakeley muck, in a forested area, at an elevation of 1,138 feet; 550 feet south and 1,670 feet west of the northeast corner of sec. 10, T. 23 N., R. 3 W., Markey Township; USGS Houghton Lake 7.5-minute topographic quadrangle; lat. 44 degrees 24 minutes 22.57 seconds N. and long. 84 degrees 47 minutes 19.59 seconds W.

Oa—0 to 4 inches; muck, black (10YR 2/1) broken faced and rubbed; about 15 percent fiber, 4 percent rubbed; about 10 percent dark grayish brown (10YR 4/2) sand grains; moderate fine and medium granular structure; very friable; many very fine, fine, and medium roots and common coarse roots; very strongly acid; abrupt smooth boundary.

Cg—4 to 6 inches; dark grayish brown (10YR 4/2) sand; weak fine and medium subangular blocky structure; very friable; many very fine and fine and few medium and coarse roots; few distinct discontinuous black (2.5Y 2.5/1) organic coatings on faces of peds; few medium prominent dark yellowish brown (10YR 4/6) and common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation; 1 percent gravel; very strongly acid; abrupt wavy boundary.

C—6 to 21 inches; light olive brown (2.5Y 5/3) sand; weak coarse subangular blocky structure parting to single grain; very friable; common very fine and few fine and medium roots; black (2.5Y 2.5/1) filled root channels and organic coatings occupy about 4 percent of the horizon above a depth of 14 inches; few medium prominent strong brown (7.5YR 4/6) and few medium prominent yellowish brown (10YR 5/6) masses of iron accumulation; 1 percent gravel; moderately acid; clear wavy boundary.

C´g—21 to 38 inches; stratified grayish brown (2.5Y 5/2) and dark gray (2.5Y 4/1) sand; single grain; loose; 1 percent gravel; neutral; clear wavy boundary.

2Cg1—38 to 60 inches; dark gray (2.5Y 4/1) silty clay loam; massive; firm; few very fine and fine roots; very few distinct discontinuous black (2.5Y 2.5/1) organic coatings throughout; 1 percent gravel; slightly effervescent; neutral; gradual wavy boundary.

2Cg2—60 to 80 inches; dark gray (2.5Y 4/1) silty clay loam; massive; firm; very few distinct discontinuous black (2.5Y 2.5/1) organic coatings throughout; 1 percent gravel; strongly effervescent; neutral.

The depth to the clayey material ranges from 22 to 40 inches. The content of gravel ranges from 0 to 5 percent throughout the profile. The depth to carbonates ranges from 24 to more than 40 inches.

The O horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3.

The Cg horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2.

The 2Cg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2.

Formation of the Soils

This section describes the factors of soil formation and relates them to the soils in the survey area. It also explains the processes of soil formation.

Factors of Soil Formation

Soil forms through the interaction of five major factors: the physical, chemical, and mineral composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or topography; and the length of time that the processes of soil formation have acted on the parent material.

Climate and plant and animal life are the active forces in soil formation. They slowly change the parent material into a natural body of soil that has genetically related layers, called horizons. The effects of climate and plant and animal life are conditioned by relief. The nature of the parent material also affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time changes the parent material into a soil. It can be a long time or a short time, but a long time is generally required for the formation of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made about the effect of any one factor unless conditions are specified for the other four. Many of the processes of soil formation are unknown.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. The parent material of the soils in Roscommon County was deposited by glaciers or by meltwater from the glaciers. Much of this material was subsequently reworked by water and wind. The glaciers covered the county about 12,000 years ago. Parent material determines the chemical and mineralogical composition of the soil. Although the parent materials of the soils in the survey area are of common glacial origin, their properties vary greatly, sometimes within a small area, depending on how the material was deposited. The dominant parent materials in Roscommon County were deposited as till, outwash material, alluvium, and organic material.

Till is material that was deposited directly by glaciers with a minimum of water action. It consists of a mixture of particles of different sizes. The small pebbles in till have sharp corners, indicating that they have not been worn by water. The till in Roscommon County generally is calcareous clay loam. Nester, Kawkawlin, and Sims soils are examples of soils that formed in till. Typically, these soils are moderately fine textured and have strongly developed structure.

Outwash material was deposited by running water from melting glaciers. The size of the particles that make up outwash material depends on the speed of the water that carried them. When the water slows down, the coarser particles are deposited. The finer particles, such as very fine sand, silt, and clay, are carried by slowly moving water. Outwash deposits generally consist of layers of particles of similar size, from sandy loam to sand, coarse sand, and gravelly sand. Grayling, Graycalm, and Deford soils are examples of soils that formed in outwash.

Alluvial material has been deposited by floodwater of present streams in recent time. The texture of this material depends on the speed of the water that deposited the material. Ausable soils are examples of alluvial soils.

Organic material is made up of plant remains. After the glaciers receded from the area, water was left standing in depressions on outwash plains, flood plains, and till plains. Grasses and sedges that grew around the edge of these depressions died. Because of the wetness, when the plants died their remains did not decompose but accumulated around the edge of the depressions. Later, water-tolerant trees grew in the areas, and as these trees died, their residue became part of the organic accumulation. Consequently, the depressions were eventually filled with organic material and developed into areas of muck. Lupton,

Tawas, and Dawson soils are examples of soils that formed in organic material.

Plant and Animal Life

Green plants have been the principal organism influencing the soils in Roscommon County. Bacteria, fungi, and earthworms have also been important, and human activities have also had an effect on the soils. The chief contribution of plant and animal life is the addition of organic matter and nitrogen to the soil. The kind of organic matter on and in the soil depends on the kinds of plants that have grown on the soil. The residue of these plants accumulates on the surface of the soil; the residue decays and eventually becomes organic matter. Plant roots provide channels for the downward movement of water through the soil; plant roots add organic matter to the soil as they decay. Bacteria in the soil help to break down the organic matter into a form that can be used by plants.

The vegetation in Roscommon County is a mixture of coniferous and deciduous forest. Differences in natural soil drainage and changes in parent material affect the composition of forests.

In general, the well drained upland soils, such as Grayling, Graycalm, and Klacking soils, were covered with northern red oak, aspen, red pine, and white oak. The somewhat poorly drained Au Gres, Finch, and Allendale soils were covered with red maple, aspen, paper birch, red pine, and balsam fir. The poorly drained and very poorly drained Deford, Kinross, Tawas, and Lupton soils were covered with northern white cedar, balsam fir, black spruce, and tamarack.

Climate

Climate is important in the formation of soils. It determines the kind of plant and animal life on and in the soil, and it determines the amount of water available for the weathering of minerals and the transporting of soil materials. Through its influence on soil temperature, climate determines the rate of chemical reaction in the soil. These climatic influences generally affect areas larger than a county.

The climate in Roscommon County is cool and humid. It is presumed to be similar to the climate in which the soils formed. The soils in Roscommon County differ from soils that formed in a dry, warm climate or from those that formed in a moist, hot climate. Climate is uniform throughout the county, but its effect is modified locally by the proximity to large lakes. The minor differences in the soils in Roscommon County are partially the result of climatic differences.

Relief

Relief, or topography, has had a marked influence on the formation of the soils in Roscommon County through its influence on natural drainage, erosion, plant cover, and soil temperature. In most parts of the county, the areas at the highest elevations are likely to be glacial kame soils. The soils at the adjacent lower elevations are typically outwash soils. Exceptions are in the central and northwestern parts of the county.

The slopes in the survey area range from 0 to 40 percent. Natural drainage ranges from excessively drained on hilltops to very poorly drained in the depressions.

Relief influences the formation of soils by affecting runoff and drainage. Drainage, in turn, through its effect on aeration of the soil, determines the color of the soil. Runoff is most rapid on the steeper slopes, but in low areas, water is temporarily ponded. Water and air move freely through well drained soils but slowly through very poorly drained soils. In soils that are well aerated, the iron and aluminum compounds that give most soils their color are brightly colored and are oxidized.

Poorly aerated soils are dull gray and mottled. Geels soils are examples of well drained, well aerated soils; Deford soils are examples of very poorly drained, poorly aerated soils. Both of these soils formed in similar parent material.

Time

Generally, a long time is required for the development of distinct horizons in a soil. The differences in the length of time that the parent material has been in place are commonly reflected in the degree of development of the soil profile. Some soils form rapidly; others form slowly.

The soils of Roscommon County range from young to mature. The glacial deposits in which many of the soils formed have been exposed to soil-forming factors long enough for the development of distinct horizons. Some soils forming in recent alluvial sediment have not been in place long enough for the development of distinct horizons. Ausable soils, which formed in alluvial material, are young soils. Klacking soils have been in place long enough for lime to be leached from the profile.

Processes of Soil Formation

The process responsible for the development of the soil horizons from unconsolidated parent material is

referred to as soil genesis. Soil morphology describes the physical, chemical, and biological properties of these horizons.

Several processes were involved in the development of soil horizons in Roscommon County, including the accumulation of organic matter, the leaching of lime (calcium carbonate) and other bases, the reduction and transfer of iron, and the formation and translocation of clay minerals. In most soils, more than one of these processes has been active in the development of horizons.

Organic matter accumulates at the surface to form an A horizon. If the soil is plowed, the A horizon is mixed into a plow layer, or Ap horizon. The content of organic matter in the surface layer of the soils in Roscommon County ranges from high to low. For example, Deford and Kinross soils have a high content of organic matter in the surface layer, and Grayling and Graycalm soils have a low content of organic matter.

Leaching of carbonates and other bases has occurred in most of the soils. Soil scientists generally agree that leaching of bases in soils precedes the translocation of clay minerals. Many of the soils in Roscommon County are moderately or strongly leached. For example, Nester soils are leached of carbonates to a depth of 20 to 40 inches, whereas Grayling soils are leached to a depth of more than 80 inches. This difference in the depth of leaching is a result of time, relief, and parent material.

The reduction and transfer of iron, a process called gleying, is evident in the somewhat poorly drained, poorly drained, and very poorly drained soils. The gray or dull color in the subsoil indicates the reduction and loss of iron. Sims soils are examples of soils in which the gleying processes are evident.

The translocation of clay minerals has contributed to horizon development. An eluviated, or leached, E horizon above an illuviated B horizon has a lower content of clay than the B horizon and typically is lighter in color. The B horizon typically has an accumulation of clay and clay films in pores and on the faces of peds. The soils displaying this translocation of clay were probably leached of carbonates and soluble salts to a considerable extent before the translocation of clay took place. Leaching of bases and translocation of clays are among the more important processes in horizon differentiation. Nester soils are examples of soils that have translocated clay in the form of clay films accumulated in the B horizon.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

End moraine. A ridgelike accumulation of till that is being produced or has been produced at the outer margin of an actively flowing glacier at any given time.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Flat. A general term for a level or nearly level surface, or a small area of land marked by little or no relief.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground moraine. An extensive, fairly even layer of till having an uneven or undulating surface.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Kame. An irregular, short ridge or hill of stratified drift.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain (geology). A nearly level surface marking the floor of an extinct lake filled by well sorted, coarse textured to fine textured, stratified sediments.

Lamellae. Thin layers in the soil in which illuviated clay particles have accumulated. The layers generally form in sandy soils and are commonly irregular or discontinuous.

Landform. An individual feature of the earth’s surface. Large features include plateaus and mountains; small features include hills, dunes, kames, and hillslopes.

Landscape. A collection or population of landforms.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic mat. A zone of accumulation of organic material, such as leaves, twigs, and grasses, in various stages of decomposition. This zone lies above the mineral soil. It is often described in forest regions and is commonly called duff or forest litter.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Ortstein. A hardened mass or layer in the soil in which the cemented material consists of illuviated compounds of iron and aluminum and organic matter.

Outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Relief. The elevations or inequalities of a land surface, considered collectively.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for complex slopes are as follows:

Level	0 to 2 percent
Nearly level	0 to 3 percent
Gently undulating	0 to 6 percent
Undulating	2 to 6 percent
Gently rolling	6 to 12 percent
Rolling	6 to 18 percent
Hilly	12 to 25 percent
Steep	18 to 45 percent
Very steep	45 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Terminal moraine. A belt of thick drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till. Unsorted, nonstratified drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Till plain. An extensive area of nearly level to undulating soils underlain by till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1964-90 at Houghton Lake, Michigan)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	25.5	8.6	17.1	47	-21	0	1.58	1.05	2.07	4	19.3
February---	28.2	8.5	18.4	49	-22	1	1.28	.67	1.81	4	12.9
March------	38.3	18.2	28.2	67	-15	23	2.08	1.25	2.83	5	11.9
April------	52.8	31.7	42.3	80	11	154	2.26	1.53	2.93	6	4.2
May--------	66.1	42.0	54.1	86	25	441	2.55	1.45	3.53	5	.3
June-------	74.6	50.7	62.6	90	32	679	3.12	1.67	4.39	6	.0
July-------	79.8	55.5	67.6	93	38	857	2.49	1.39	3.47	5	.0
August-----	76.4	53.9	65.1	90	35	779	3.37	1.81	4.74	6	.0
September--	67.8	46.9	57.3	86	27	521	3.37	1.21	5.17	6	.0
October----	55.3	37.0	46.1	78	19	221	2.22	1.36	2.99	6	.9
November---	41.8	28.3	35.0	66	6	50	2.32	1.38	3.16	6	9.7
December---	29.8	16.3	23.1	53	-13	4	2.07	1.28	2.78	5	16.9
Yearly:											
Average---	53.0	33.1	43.1	---	---	---	---	---	---	---	---
Extreme---	98	-34	---	94	-24	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,729	28.71	23.94	31.79	64	76.0

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1964-90 at Houghton Lake, Michigan)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 4	May 16	June 8
2 years in 10 later than--	Apr. 29	May 12	June 2
5 years in 10 later than--	Apr. 20	May 3	May 21
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 3	Sept. 21	Sept. 6
2 years in 10 earlier than--	Oct. 10	Sept. 27	Sept. 11
5 years in 10 earlier than--	Oct. 21	Oct. 9	Sept. 21

Table 3.--Growing Season

(Recorded in the period 1964-90 at Houghton Lake, Michigan)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	161	138	102
8 years in 10	169	145	109
5 years in 10	184	159	123
2 years in 10	200	172	137
1 year in 10	208	179	144

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
13	Tawas-Lupton mucks	46,613	12.6
14	Dawson-Loxley peats	8,241	2.2
15A	Croswell-Au Gres sands, 0 to 3 percent slopes	9,275	2.5
16B	Graycalm sand, 0 to 6 percent slopes	14,350	3.9
17A	Croswell sand, 0 to 3 percent slopes	21,939	5.9
18A	Au Gres sand, 0 to 3 percent slopes	5,183	1.4
20B	Graycalm-Grayling sands, 0 to 6 percent slopes	28,507	7.7
20D	Graycalm-Grayling sands, 6 to 18 percent slopes	16,463	4.4
20F	Graycalm-Grayling sands, 18 to 45 percent slopes	2,041	0.5
23	Ausable-Bowstring mucks, frequently flooded	115	*
24A	Kinross-Au Gres complex, 0 to 3 percent slopes	4,078	1.1
26B	Cublake sand, 0 to 6 percent slopes	458	0.1
34B	Kneff very fine sandy loam, 0 to 6 percent slopes	45	*
35	Kinross muck	972	0.3
47D	Graycalm sand, 6 to 18 percent slopes	8,369	2.3
47F	Graycalm sand, 18 to 45 percent slopes	1,076	0.3
50B	Au Gres-Kinross-Croswell complex, 0 to 6 percent slopes	13,288	3.6
51	Tawas-Leafriver mucks	10,161	2.7
57B	Kawkawlin loam, 1 to 4 percent slopes	1,377	0.4
58A	Wakeley-Allendale complex, 0 to 3 percent slopes	3,431	0.9
67A	Bowers-Deerheart complex, 0 to 3 percent slopes	459	0.1
75B	Rubicon sand, 0 to 6 percent slopes	3,035	0.8
75D	Rubicon sand, 6 to 18 percent slopes	685	0.2
78	Pits, borrow	562	0.2
81B	Grayling sand, 0 to 6 percent slopes	28,198	7.6
81D	Grayling sand, 6 to 18 percent slopes	6,390	1.7
81F	Grayling sand, 18 to 45 percent slopes	2,868	0.8
82B	Udorthents, loamy, nearly level and undulating	150	*
83B	Udipsamments, nearly level and undulating	1,223	0.3
83F	Udipsamments, nearly level to very steep	150	*
86	Histosols and Aquents, ponded	10,057	2.7
87	Ausable muck, frequently flooded	1,101	0.3
90B	Chinwhisker sand, 0 to 4 percent slopes	3,016	0.8
102D	Curtisville loam, 12 to 18 percent slopes	378	0.1
103B	Nester sandy loam, 1 to 6 percent slopes	1,000	0.3
103C	Nester sandy loam, 6 to 12 percent slopes	200	*
114A	Ingalls sand, 0 to 3 percent slopes	390	0.1
120B	Morganlake sand, 0 to 6 percent slopes	1,309	0.4
120C	Morganlake sand, 6 to 12 percent slopes	217	*
123D	Klacking sand, 6 to 18 percent slopes	882	0.2
144B	Perecheney sand, 0 to 6 percent slopes	4,634	1.2
144C	Perecheney sand, 6 to 12 percent slopes	553	0.1
159A	Finch sand, 0 to 3 percent slopes	199	*
307B	Klacking sand, 0 to 6 percent slopes	5,308	1.4
307E	Klacking sand, 18 to 35 percent slopes	400	0.1
360	Wakeley muck	5,297	1.4
368A	Au Gres-Deford complex, 0 to 3 percent slopes	4,670	1.3
369	Deford muck	5,644	1.5
380	Access denied	2,438	0.7
382B	Proper sand, 0 to 6 percent slopes	321	*
408	Sims loam	1,093	0.3
410B	Proper-Finch-Deford complex, 0 to 6 percent slopes	265	*
429D	Menominee sand, 12 to 18 percent slopes	342	*
441B	Morganlake-Nester complex, 0 to 6 percent slopes	2,049	0.6
441C	Morganlake-Nester complex, 6 to 12 percent slopes	296	*
442D	Menominee-Curtisville complex, 12 to 18 percent slopes	565	0.2
473	Deford-Kinross mucks	611	0.2
474	Histosols-Fluvaquents complex, frequently flooded	2,770	0.7
475B	Graycalm-Klacking sands, 0 to 6 percent slopes	13,100	3.5
475D	Graycalm-Klacking sands, 6 to 18 percent slopes	4,137	1.1
475E	Graycalm-Klacking sands, 18 to 35 percent slopes	1,111	0.3
476B	Klacking-Perecheney sands, 0 to 6 percent slopes	2,778	0.7
476D	Klacking-Perecheney sands, 6 to 18 percent slopes	981	0.3

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
490	Urban land-Aquents, nearly level	1,220	0.3
491A	Geels sand, 0 to 3 percent slopes	816	0.2
492A	Allendale sand, 0 to 3 percent slopes, sandy substratum	1,568	0.4
493A	Otisco sand, 0 to 3 percent slopes	2,607	0.7
495B	Gerrish sand, 0 to 6 percent slopes	1,525	0.4
495D	Gerrish sand, 6 to 18 percent slopes	1,800	0.5
495F	Gerrish sand, 18 to 45 percent slopes	432	0.1
496B	Gerrish-Grayling sands, 0 to 6 percent slopes	2,400	0.6
496D	Gerrish-Grayling sands, 6 to 18 percent slopes	253	*
496F	Gerrish-Grayling sands, 18 to 45 percent slopes	108	*
497A	Debolt sandy loam, 0 to 3 percent slopes	287	*
498A	Pinewood sandy loam, 0 to 2 percent slopes	594	0.2
499	Dawson-Kinross complex	294	*
500A	Flink sand, 0 to 3 percent slopes	630	0.2
501B	Kellogg sand, 0 to 6 percent slopes, sandy substratum	2,919	0.8
502B	Kawkawlin-Sims loams, 0 to 4 percent slopes	387	0.1
W	Water	35,449	9.5
	Total	371,251	100.0

* Less than 0.1 percent.

Table 5.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
34B	Kneff very fine sandy loam, 0 to 6 percent slopes
57B	Kawkawlin loam, 1 to 4 percent slopes (where drained)
67A	Bowers-Deerheart complex, 0 to 3 percent slopes (where drained)
103B	Nester sandy loam, 1 to 6 percent slopes
408	Sims loam (where drained)
497A	Debolt sandy loam, 0 to 3 percent slopes
498A	Pinewood sandy loam, 0 to 2 percent slopes (where drained)
502B	Kawkawlin-Sims loams, 0 to 4 percent slopes (where drained)

Table 6.--Land Capability and Yields per Acre of Crops and Hay

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Corn	Oats	Rye	Winter wheat	Bromegrass-alfalfa hay	Timothy-alfalfa hay	Timothy-red clover	Trefoil-grass hay
		Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
13:									
Tawas	6w	---	---	---	---	---	---	---	---
Lupton	6w	---	---	---	---	---	---	---	---
14:									
Dawson	7w	---	---	---	---	---	---	---	---
Loxley	7w	---	---	---	---	---	---	---	---
15A:									
Croswell	4s	---	---	---	---	---	---	---	---
Au Gres	4w	---	---	---	---	---	---	---	---
16B:									
Graycalm	4s	---	---	---	---	---	---	---	---
17A:									
Croswell	4s	---	---	---	---	---	---	---	---
18A:									
Au Gres	4w	---	---	---	---	---	---	---	---
20B:									
Graycalm	4s	---	---	---	---	---	---	---	---
Grayling	6s	---	---	---	---	---	---	---	---
20D:									
Graycalm	6s	---	---	---	---	---	---	---	---
Grayling	7s	---	---	---	---	---	---	---	---
20F:									
Graycalm	7s	---	---	---	---	---	---	---	---
Grayling	7s	---	---	---	---	---	---	---	---
23:									
Ausable	7w	---	---	---	---	---	---	---	---
Bowstring	6w	---	---	---	---	---	---	---	---

Table 6.--Land Capability and Yields per Acre of Crops and Hay--Continued

Map symbol and soil name	Land capability	Corn	Oats	Rye	Winter wheat	Bromegrass-alfalfa hay	Timothy-alfalfa hay	Timothy-red clover	Trefoil-grass hay
		Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
24A:									
Kinross-----------	6w	---	---	---	---	---	---	---	---
Au Gres-----------	4w	---	---	---	---	---	---	---	---
26B:									
Cublake-----------	4s	---	---	---	---	---	---	---	---
34B:									
Kneff-------------	2e	70	65	---	---	---	2.5	---	---
35:									
Kinross-----------	6w	---	---	---	---	---	---	---	---
47D:									
Graycalm----------	6s	---	---	---	---	---	---	---	---
47F:									
Graycalm----------	7s	---	---	---	---	---	---	---	---
50B:									
Au Gres-----------	4w	---	---	---	---	---	---	---	---
Kinross-----------	6w	---	---	---	---	---	---	---	---
Croswell----------	4s	---	---	---	---	---	---	---	---
51:									
Tawas-------------	6w	---	---	---	---	---	---	---	---
Leafriver---------	6w	---	---	---	---	---	---	---	---
57B:									
Kawkawlin---------	2e	---	60	---	---	---	---	2.5	2.0
58A:									
Wakeley-----------	5w	---	---	---	---	---	---	---	---
Allendale---------	4w	---	40	---	---	---	---	2.0	1.5
67A:									
Bowers------------	2w	---	60	---	---	---	---	2.5	2.0
Deerheart---------	5w	---	---	---	---	---	---	---	---
75B:									
Rubicon-----------	6s	---	---	---	---	---	---	---	---

Table 6.--Land Capability and Yields per Acre of Crops and Hay--Continued

Map symbol and soil name	Land capability	Corn	Oats	Rye	Winter wheat	Bromegrass-alfalfa hay	Timothy-alfalfa hay	Timothy-red clover	Trefoil-grass hay
		Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
75D:									
Rubicon-----------	7s	---	---	---	---	---	---	---	---
78.									
Pits									
81B:									
Grayling----------	6s	---	---	---	---	---	---	---	---
81D:									
Grayling----------	7s	---	---	---	---	---	---	---	---
81F:									
Grayling----------	7s	---	---	---	---	---	---	---	---
82B.									
Udorthents									
83B.									
Udipsamments									
83F.									
Udipsamments									
86:									
Histosols---------	5w	---	---	---	---	---	---	---	---
Aquents-----------	6w	---	---	---	---	---	---	---	---
87:									
Ausable-----------	7w	---	---	---	---	---	---	---	---
90B:									
Chinwhisker-------	4s	---	---	---	---	---	---	---	---
102D:									
Curtisville-------	4e	---	---	---	---	---	2.5	---	---
103B:									
Nester------------	2e	70	65	---	35	3.0	---	---	---
103C:									
Nester------------	3e	70	65	---	35	3.0	---	---	---
114A:									
Ingalls-----------	3w	---	---	---	---	---	---	---	---

Table 6.--Land Capability and Yields per Acre of Crops and Hay--Continued

Map symbol and soil name	Land capability	Corn	Oats	Rye	Winter wheat	Bromegrass-alfalfa hay	Timothy-alfalfa hay	Timothy-red clover	Trefoil-grass hay
		Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
120B:									
Morganlake--------	3s	---	---	---	---	1.8	---	---	---
120C:									
Morganlake--------	3e	---	---	---	---	1.8	---	---	---
123D:									
Klacking----------	4e	---	---	---	---	---	---	---	---
144B:									
Perecheney--------	4s	---	---	20	---	1.5	---	---	---
144C:									
Perecheney--------	4s	---	---	20	---	1.5	---	---	---
159A:									
Finch-------------	4w	---	---	---	---	---	---	---	---
307B:									
Klacking----------	3s	---	---	20	---	1.8	---	---	---
307E:									
Klacking----------	7e	---	---	---	---	---	---	---	---
360:									
Wakeley-----------	5w	---	---	---	---	---	---	---	---
368A:									
Au Gres-----------	4w	---	---	---	---	---	---	---	---
Deford------------	5w	---	---	---	---	---	---	---	---
369:									
Deford------------	5w	---	---	---	---	---	---	---	---
380.									
Access denied									
382B:									
Proper------------	4s	---	---	---	---	---	---	---	---
408:									
Sims--------------	5w	---	---	---	---	---	---	---	---

Table 6.--Land Capability and Yields per Acre of Crops and Hay--Continued

Map symbol and soil name	Land capability	Corn	Oats	Rye	Winter wheat	Bromegrass-alfalfa hay	Timothy-alfalfa hay	Timothy-red clover	Trefoil-grass hay
		Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
410B:									
Proper------------	4s	---	---	---	---	---	---	---	---
Finch-------------	4w	---	---	---	---	---	---	---	---
Deford------------	5w	---	---	---	---	---	---	---	---
429D:									
Menominee---------	4e	---	---	---	---	1.8	---	---	---
441B:									
Morganlake--------	3s	---	60	---	---	---	2.0	---	---
Nester------------	2e	70	65	---	35	3.0	---	---	---
441C:									
Morganlake--------	3e	---	60	---	---	---	2.0	---	---
Nester------------	3e	70	65	---	35	3.0	---	---	---
442D:									
Menominee---------	4e	---	---	---	---	---	---	---	---
Curtisville-------	4e	---	---	---	---	---	2.5	---	---
473:									
Deford------------	5w	---	---	---	---	---	---	---	---
Kinross-----------	6w	---	---	---	---	---	---	---	---
474:									
Histosols---------	5w	---	---	---	---	---	---	---	---
Fluvaquents-------	5w	---	---	---	---	---	---	---	---
475B:									
Graycalm----------	4s	---	---	20	---	1.8	---	---	---
Klacking----------	3s	---	---	20	---	1.8	---	---	---
475D:									
Graycalm----------	6s	---	---	---	---	---	---	---	---
Klacking----------	4e	---	---	---	---	1.8	---	---	---

Table 6.--Land Capability and Yields per Acre of Crops and Hay--Continued

Map symbol and soil name	Land capability	Corn	Oats	Rye	Winter wheat	Bromegrass-alfalfa hay	Timothy-alfalfa hay	Timothy-red clover	Trefoil-grass hay
		Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
475E:									
Graycalm----------	7s	---	---	---	---	---	---	---	---
Klacking----------	7e	---	---	---	---	---	---	---	---
476B:									
Klacking----------	3s	---	---	20	---	1.8	---	---	---
Perecheney--------	4s	---	---	20	---	1.5	---	---	---
476D:									
Klacking----------	4e	---	---	---	---	1.8	---	---	---
Perecheney--------	4s	---	---	---	---	1.5	---	---	---
490:									
Urban land.									
Aquents-----------	6w	---	---	---	---	---	---	---	---
491A:									
Geels-------------	4s	---	---	---	---	---	---	---	---
492A:									
Allendale, sandy substratum-------	4w	---	40	---	---	---	---	2.0	1.5
493A:									
Otisco------------	3w	---	---	---	---	---	---	---	---
495B:									
Gerrish-----------	4s	---	---	---	---	---	---	---	---
495D:									
Gerrish-----------	6s	---	---	---	---	---	---	---	---
495F:									
Gerrish-----------	7s	---	---	---	---	---	---	---	---
496B:									
Gerrish-----------	4s	---	---	---	---	---	---	---	---
Grayling----------	6s	---	---	---	---	---	---	---	---

Table 6.--Land Capability and Yields per Acre of Crops and Hay--Continued

Map symbol and soil name	Land capability	Corn	Oats	Rye	Winter wheat	Bromegrass-alfalfa hay	Timothy-alfalfa hay	Timothy-red clover	Trefoil-grass hay
		Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
496D:									
Gerrish	6s	---	---	---	---	---	---	---	---
Grayling	7s	---	---	---	---	---	---	---	---
496F:									
Gerrish	7s	---	---	---	---	---	---	---	---
Grayling	7s	---	---	---	---	---	---	---	---
497A:									
Debolt	2e	---	60	---	---	---	2.5	---	---
498A:									
Pinewood	2w	---	60	---	---	---	---	2.5	2.0
499:									
Dawson	7w	---	---	---	---	---	---	---	---
Kinross	6w	---	---	---	---	---	---	---	---
500A:									
Flink	4w	---	---	---	---	---	---	---	---
501B:									
Kellogg, sandy substratum	3s	---	---	---	---	---	---	---	---
502B:									
Kawkawlin	2e	---	60	---	---	---	---	2.5	2.0
Sims	5w	---	---	---	---	---	---	---	---

Table 7.--Forestland Management and Productivity

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
13:									
Tawas	5W	Slight	Severe	Severe	Severe	Balsam fir	40	72	---
						Black ash	---	---	
						Northern whitecedar	---	---	
						Quaking aspen	---	---	
						Red maple	---	---	
Lupton	2W	Slight	Severe	Severe	Severe	Balsam fir	46	86	---
						Black ash	---	---	
						Black spruce	20	29	
						Northern whitecedar	---	---	
						Paper birch	---	---	
						Quaking aspen	---	---	
						Red maple	---	---	
						Tamarack	---	---	
						White spruce	---	---	
14:									
Dawson	2W	Slight	Severe	Severe	Severe	Black spruce	15	29	---
						Tamarack	---	---	
Loxley	2W	Slight	Severe	Severe	Severe	Balsam fir	---	---	---
						Black spruce	15	29	
						Tamarack	---	---	
15A:									
Croswell	5S	Slight	Moderate	Moderate	Moderate	Black cherry	---	---	Eastern white pine, red pine, white spruce
						Eastern white pine	---	---	
						Jack pine	53	72	
						Northern red oak	---	---	
						Quaking aspen	68	72	
						Red maple	---	---	
						Red pine	55	86	
						White oak	---	---	
Au Gres	6W	Slight	Severe	Moderate	Severe	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
						Bigtooth aspen	---	---	
						Eastern hemlock	---	---	
						Eastern white pine	---	---	
						Jack pine	51	72	
						Northern whitecedar	---	---	
						Paper birch	---	---	
						Quaking aspen	70	86	
						Red maple	65	43	
						Yellow birch	---	---	
16B:									
Graycalm	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	70	86	Eastern white pine, red pine
						Eastern white pine	---	---	
						Jack pine	56	86	
						Northern red oak	62	57	
						Paper birch	---	---	
						Quaking aspen	60	57	
						Red pine	61	100	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
17A:									
Croswell----------------	5S	Slight	Moderate	Moderate	Moderate	Black cherry--------	---	---	Eastern white pine, red pine, white spruce
						Eastern white pine--	---	---	
						Jack pine-----------	53	72	
						Northern red oak----	---	---	
						Quaking aspen-------	68	72	
						Red maple-----------	---	---	
						Red pine------------	55	86	
						White oak-----------	---	---	
18A:									
Au Gres-----------------	6W	Slight	Severe	Moderate	Severe	Balsam fir----------	---	---	Norway spruce, eastern white pine, red pine, white spruce
						Bigtooth aspen------	---	---	
						Eastern hemlock-----	---	---	
						Eastern white pine--	---	---	
						Jack pine-----------	51	72	
						Northern whitecedar	---	---	
						Paper birch---------	---	---	
						Quaking aspen-------	70	86	
						Red maple-----------	65	43	
						Yellow birch--------	---	---	
20B:									
Graycalm----------------	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, red pine
						Eastern white pine--	---	---	
						Jack pine-----------	56	86	
						Northern red oak----	62	57	
						Paper birch---------	---	---	
						Quaking aspen-------	60	57	
						Red pine------------	61	100	
Grayling----------------	4S	Slight	Moderate	Moderate	Slight	Jack pine-----------	48	57	Jack pine, red pine
						Northern pin oak----	43	29	
						Quaking aspen-------	---	---	
						Red pine------------	---	---	
						White oak-----------	---	---	
20D:									
Graycalm----------------	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, red pine
						Eastern white pine--	---	---	
						Jack pine-----------	56	86	
						Northern red oak----	62	57	
						Paper birch---------	---	---	
						Quaking aspen-------	60	57	
						Red pine------------	61	100	
Grayling----------------	4S	Slight	Moderate	Moderate	Slight	Jack pine-----------	48	57	Jack pine, red pine
						Northern pin oak----	43	29	
						Quaking aspen-------	---	---	
						Red pine------------	---	---	
						White oak-----------	---	---	
20F:									
Graycalm----------------	6R	Moderate	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Jack pine, red pine
						Jack pine-----------	56	86	
						Northern red oak----	62	57	
						Red pine------------	61	100	
						White oak-----------	---	---	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
20F:									
Grayling	4S	Slight	Moderate	Moderate	Slight	Jack pine	48	57	Jack pine, red pine
						Northern pin oak	43	29	
						Quaking aspen	---	---	
						Red pine	---	---	
						White oak	---	---	
23:									
Ausable	2W	Slight	Severe	Severe	Severe	Balsam poplar	---	---	---
						Bigtooth aspen	---	---	
						Black ash	---	---	
						Black spruce	---	---	
						Northern whitecedar	15	29	
						Paper birch	---	---	
Bowstring	3W	Slight	Severe	Severe	Severe	Black ash	---	---	---
						Eastern hemlock	---	---	
						Northern whitecedar	15	43	
						Red maple	---	---	
24A:									
Kinross	2W	Slight	Severe	Severe	Severe	Black spruce	15	29	Quaking aspen
						Jack pine	---	---	
Au Gres	6W	Slight	Severe	Moderate	Severe	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
						Bigtooth aspen	---	---	
						Eastern hemlock	---	---	
						Eastern white pine	---	---	
						Jack pine	51	72	
						Northern whitecedar	---	---	
						Paper birch	---	---	
						Quaking aspen	70	86	
						Red maple	65	43	
						Yellow birch	---	---	
26B:									
Cublake	7A	Slight	Slight	Slight	Slight	Balsam fir	---	---	Eastern white pine, jack pine, red pine
						Eastern white pine	---	---	
						Northern red oak	---	---	
						Paper birch	---	---	
						Quaking aspen	---	---	
						Red maple	---	---	
						Red pine	60	100	
34B:									
Kneff	3	Slight	Severe	Slight	Slight	Balsam fir	---	---	Eastern white pine, red pine, white spruce
						Eastern hemlock	---	---	
						Eastern white pine	---	---	
						Northern red oak	---	---	
						Red maple	62	43	
						Red pine	---	---	
						White spruce	---	---	
35:									
Kinross	2W	Slight	Severe	Severe	Severe	Black spruce	15	29	Quaking aspen
						Jack pine	---	---	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
								cu ft/ac	
47D:									
Graycalm----------------	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, red pine
						Eastern white pine--	---	---	
						Jack pine-----------	56	86	
						Northern red oak----	62	57	
						Paper birch---------	---	---	
						Quaking aspen-------	60	57	
						Red pine------------	61	100	
47F:									
Graycalm----------------	6R	Moderate	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, red pine
						Northern pin oak----	---	---	
						Northern red oak----	62	57	
						Red maple-----------	---	---	
						White oak-----------	---	---	
50B:									
Au Gres-----------------	6W	Slight	Severe	Moderate	Severe	Balsam fir----------	---	---	Norway spruce, eastern white pine, red pine, white spruce
						Bigtooth aspen------	---	---	
						Eastern hemlock-----	---	---	
						Eastern white pine--	---	---	
						Jack pine-----------	51	72	
						Northern whitecedar	---	---	
						Paper birch---------	---	---	
						Quaking aspen-------	70	86	
						Red maple-----------	65	43	
						Yellow birch--------	---	---	
Kinross-----------------	2W	Slight	Severe	Severe	Severe	Black spruce--------	15	29	Quaking aspen
						Jack pine-----------	---	---	
Croswell----------------	5S	Slight	Moderate	Moderate	Moderate	Black cherry--------	---	---	Eastern white pine, red pine, white spruce
						Eastern white pine--	---	---	
						Jack pine-----------	53	72	
						Northern red oak----	---	---	
						Quaking aspen-------	68	72	
						Red maple-----------	---	---	
						Red pine------------	55	86	
						White oak-----------	---	---	
51:									
Tawas-------------------	5W	Slight	Severe	Severe	Severe	Balsam fir----------	40	72	---
						Black ash-----------	---	---	
						Northern whitecedar	---	---	
						Quaking aspen-------	---	---	
						Red maple-----------	---	---	
Leafriver---------------	2W	Slight	Severe	Severe	Severe	Balsam fir----------	---	---	---
						Balsam poplar-------	---	---	
						Black spruce--------	---	---	
						Northern whitecedar	---	---	
						Quaking aspen-------	45	29	
						Red maple-----------	---	---	
						Tamarack------------	---	---	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
57B:									
Kawkawlin	3W	Slight	Severe	Slight	Moderate	American basswood	---	---	Norway spruce, eastern white pine, red pine, white spruce
						Bigtooth aspen	---	---	
						Northern red oak	---	---	
						Quaking aspen	---	---	
						Red maple	---	---	
						Sugar maple	60	43	
						Swamp white oak	---	---	
						White ash	---	---	
58A:									
Wakeley	3W	Slight	Severe	Severe	Severe	Balsam fir	---	---	Northern whitecedar
						Black spruce	---	---	
						Northern whitecedar	---	---	
						Quaking aspen	50	43	
Allendale	4W	Slight	Severe	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, northern red oak
						Eastern white pine	---	---	
						Northern red oak	---	---	
						Paper birch	---	---	
						Quaking aspen	60	57	
						Red maple	---	---	
						Red pine	---	---	
67A:									
Bowers	7W	Slight	Severe	Slight	Moderate	Balsam fir	54	100	Norway spruce, eastern white pine, white spruce
						Northern red oak	---	---	
						Quaking aspen	---	---	
						White ash	---	---	
Deerheart	7W	Slight	Severe	Severe	Severe	Balsam fir	---	---	---
						Northern whitecedar	---	---	
						Quaking aspen	81	100	
75B:									
Rubicon	4S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
						Eastern white pine	45	72	
						Jack pine	53	72	
						Northern red oak	---	---	
						Quaking aspen	60	57	
						Red maple	57	29	
						Red pine	53	86	
						White oak	---	---	
75D:									
Rubicon	4S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	66	72	Eastern white, pine, jack pine, red pine
						Eastern white pine	45	72	
						Jack pine	53	72	
						Northern red oak	---	---	
						Quaking aspen	60	57	
						Red maple	57	29	
						Red pine	53	86	
						White oak	---	---	
78.									
Pits									

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
81B:									
Grayling----------------	4S	Slight	Moderate	Moderate	Slight	Jack pine-----------	48	57	Jack pine, red pine
						Northern pin oak----	43	29	
						Quaking aspen-------	---	---	
						Red pine------------	---	---	
						White oak-----------	---	---	
81D:									
Grayling----------------	4S	Slight	Moderate	Moderate	Slight	Jack pine-----------	48	57	Jack pine, red pine
						Northern pin oak----	43	29	
						Quaking aspen-------	---	---	
						Red pine------------	---	---	
						White oak-----------	---	---	
81F:									
Grayling----------------	4S	Slight	Moderate	Moderate	Slight	Jack pine-----------	48	57	Jack pine, red pine
						Northern pin oak----	43	29	
						Quaking aspen-------	---	---	
						Red pine------------	---	---	
						White oak-----------	---	---	
82B. Udorthents									
83B, 83F. Udipsamments									
86. Histosols and Aquents									
87:									
Ausable-----------------	2W	Slight	Severe	Severe	Severe	Balsam poplar-------	---	---	---
						Bigtooth aspen------	---	---	
						Black ash-----------	---	---	
						Black spruce--------	---	---	
						Northern whitecedar	15	29	
						Paper birch---------	---	---	
90B:									
Chinwhisker-------------	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, jack pine, white spruce
						Jack pine-----------	56	86	
						Paper birch---------	---	---	
						Quaking aspen-------	---	---	
						Red maple-----------	---	---	
102D:									
Curtisville-------------	3	Slight	Moderate	Slight	Slight	American basswood---	---	---	Norway spruce, eastern white pine, red, pine, white spruce
						American beech------	---	---	
						Black cherry--------	---	---	
						Northern red oak----	---	---	
						Quaking aspen-------	---	---	
						Sugar maple---------	61	43	
						White ash-----------	---	---	
						White oak-----------	---	---	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
103B:									
Nester	3	Slight	Moderate	Slight	Slight	American basswood	---	---	Norway spruce, eastern white pine, red pine, white spruce
						American beech	---	---	
						Black cherry	---	---	
						Northern red oak	---	---	
						Quaking aspen	---	---	
						Sugar maple	61	43	
						White ash	---	---	
						White oak	---	---	
103C:									
Nester	3	Slight	Moderate	Slight	Slight	American basswood	---	---	Norway spruce, eastern white pine, red pine, white spruce
						American beech	---	---	
						Black cherry	---	---	
						Northern red oak	---	---	
						Quaking aspen	---	---	
						Sugar maple	61	43	
						White ash	---	---	
						White oak	---	---	
114A:									
Ingalls	4W	Slight	Severe	Moderate	Severe	Balsam fir	---	---	Eastern white pine, northern whitecedar, white ash, white spruce
						Eastern hemlock	---	---	
						Jack pine	---	---	
						Northern pin oak	---	---	
						Northern whitecedar	---	---	
						Paper birch	---	---	
						Quaking aspen	60	57	
						Red maple	---	---	
						Sugar maple	---	---	
						White ash	---	---	
120B:									
Morganlake	6A	Slight	Moderate	Moderate	Slight	American basswood	---	---	Eastern white pine, red pine, white spruce
						Balsam fir	---	---	
						Bigtooth aspen	76	86	
						Black cherry	---	---	
						Northern red oak	63	57	
						Paper birch	---	---	
						Quaking aspen	74	86	
						Red pine	62	114	
						Sugar maple	---	---	
						Yellow birch	---	---	
120C:									
Morganlake	6A	Slight	Moderate	Moderate	Slight	American basswood	---	---	Eastern white pine, red pine, white spruce
						Balsam fir	---	---	
						Bigtooth aspen	76	86	
						Black cherry	---	---	
						Northern red oak	63	57	
						Paper birch	---	---	
						Quaking aspen	74	86	
						Red pine	62	114	
						Sugar maple	---	---	
						Yellow birch	---	---	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
123D:									
Klacking	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	70	86	Eastern white pine, red pine
						Black cherry	---	---	
						Jack pine	---	---	
						Northern pin oak	---	---	
						Northern red oak	60	57	
						Quaking aspen	---	---	
						Red maple	---	---	
						Red pine	---	---	
						White oak	57	43	
144B:									
Perecheney	6S	Slight	Moderate	Moderate	Slight	Balsam fir	---	---	Eastern white pine, red pine, white spruce
						Black cherry	---	---	
						Eastern white pine	---	---	
						Jack pine	---	---	
						Northern red oak	---	---	
						Quaking aspen	70	86	
						Red maple	---	---	
						Red pine	---	---	
						White oak	---	---	
144C:									
Perecheney	6S	Slight	Moderate	Moderate	Slight	Balsam fir	---	---	Eastern white pine, red pine, white spruce
						Black cherry	---	---	
						Eastern white pine	---	---	
						Jack pine	---	---	
						Northern red oak	---	---	
						Quaking aspen	70	86	
						Red maple	---	---	
						Red pine	---	---	
						White oak	---	---	
159A:									
Finch	4W	Slight	Severe	Moderate	Severe	Black spruce	38	43	Eastern white pine, red pine, white spruce
						Eastern white pine	53	100	
						Jack pine	52	72	
						Northern red oak	56	43	
						Paper birch	54	57	
						Quaking aspen	56	57	
						Red maple	56	29	
307B:									
Klacking	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	70	86	Eastern white pine, red pine
						Black cherry	---	---	
						Jack pine	---	---	
						Northern pin oak	---	---	
						Northern red oak	60	57	
						Quaking aspen	---	---	
						Red maple	---	---	
						Red pine	---	---	
						White oak	57	43	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns: Erosion hazard	Management concerns: Equip-ment limita-tion	Management concerns: Seedling mortal-ity	Management concerns: Wind-throw hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
307E:									
Klacking----------------	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, red pine
						Black cherry--------	---	---	
						Jack pine-----------	---	---	
						Northern pin oak----	---	---	
						Northern red oak----	60	57	
						Quaking aspen-------	---	---	
						Red maple-----------	---	---	
						Red pine------------	---	---	
						White oak-----------	57	43	
360:									
Wakeley-----------------	3W	Slight	Severe	Severe	Severe	Balsam fir----------	---	---	Northern whitecedar
						Black spruce--------	---	---	
						Northern whitecedar	---	---	
						Quaking aspen-------	50	43	
368A:									
Au Gres-----------------	6W	Slight	Severe	Moderate	Severe	Balsam fir----------	---	---	Norway spruce, eastern white pine, red pine, white spruce
						Bigtooth aspen------	---	---	
						Eastern hemlock-----	---	---	
						Eastern white pine--	---	---	
						Jack pine-----------	51	72	
						Northern whitecedar	---	---	
						Paper birch---------	---	---	
						Quaking aspen-------	70	86	
						Red maple-----------	65	43	
						Yellow birch--------	---	---	
Deford------------------	4W	Slight	Severe	Severe	Severe	American basswood---	---	---	Eastern white pine, white spruce
						Balsam fir----------	---	---	
						Northern whitecedar	---	---	
						Quaking aspen-------	60	57	
						Red maple-----------	64	43	
369:									
Deford------------------	4W	Slight	Severe	Severe	Severe	American basswood---	---	---	Eastern white pine, white spruce
						Balsam fir----------	---	---	
						Northern whitecedar	---	---	
						Quaking aspen-------	60	57	
						Red maple-----------	64	43	
380.									
Access denied									
382B:									
Proper------------------	5W	Slight	Moderate	Moderate	Slight	Jack pine-----------	---	---	Eastern white pine, red pine, white spruce
						Quaking aspen-------	65	72	
						Red maple-----------	---	---	
						Red pine------------	---	---	
408:									
Sims--------------------	4W	Slight	Severe	Severe	Severe	American basswood---	---	---	---
						Balsam fir----------	---	---	
						Bigtooth aspen------	57	57	
						Black spruce--------	---	---	
						Northern whitecedar	---	---	
						Quaking aspen-------	---	---	
						White ash-----------	---	---	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
410B:									
Proper	5W	Slight	Moderate	Moderate	Slight	Jack pine	---	---	Eastern white pine, red pine, white spruce
						Quaking aspen	65	72	
						Red maple	---	---	
						Red pine	---	---	
Finch	4W	Slight	Severe	Moderate	Severe	Black spruce	38	43	Eastern white pine, red pine, white spruce
						Eastern white pine	53	100	
						Jack pine	52	72	
						Northern red oak	56	43	
						Paper birch	54	57	
						Quaking aspen	56	57	
						Red maple	56	29	
Deford	4W	Slight	Severe	Severe	Severe	American basswood	---	---	Eastern white pine, white spruce
						Balsam fir	---	---	
						Northern whitecedar	---	---	
						Quaking aspen	60	57	
						Red maple	64	43	
429D:									
Menominee	6S	Slight	Moderate	Moderate	Slight	American basswood	---	---	White spruce
						Bigtooth aspen	76	86	
						Black cherry	---	---	
						Northern red oak	63	57	
						Paper birch	---	---	
						Quaking aspen	74	86	
						Red pine	62	114	
						Sugar maple	---	---	
						White ash	77	72	
						White oak	77	72	
441B:									
Morganlake	6A	Slight	Moderate	Moderate	Slight	American basswood	---	---	Eastern white pine, red pine, white spruce
						Balsam fir	---	---	
						Bigtooth aspen	76	86	
						Black cherry	---	---	
						Northern red oak	63	57	
						Paper birch	---	---	
						Quaking aspen	74	86	
						Red pine	62	114	
						Sugar maple	---	---	
						Yellow birch	---	---	
Nester	3	Slight	Moderate	Slight	Slight	American basswood	---	---	Norway spruce, eastern white pine, red pine, white spruce
						American beech	---	---	
						Black cherry	---	---	
						Northern red oak	---	---	
						Quaking aspen	---	---	
						Sugar maple	61	43	
						White ash	---	---	
						White oak	---	---	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
441C:									
Morganlake	6A	Slight	Moderate	Moderate	Slight	American basswood	---	---	Eastern white pine, red pine, white spruce
						Balsam fir	---	---	
						Bigtooth aspen	76	86	
						Black cherry	---	---	
						Northern red oak	63	57	
						Paper birch	---	---	
						Quaking aspen	74	86	
						Red pine	62	114	
						Sugar maple	---	---	
						Yellow birch	---	---	
Nester	3	Slight	Moderate	Slight	Slight	American basswood	---	---	Norway spruce, eastern white pine, red pine, white spruce
						American beech	---	---	
						Black cherry	---	---	
						Northern red oak	---	---	
						Quaking aspen	---	---	
						Sugar maple	61	43	
						White ash	---	---	
						White oak	---	---	
442D:									
Menominee	6S	Slight	Moderate	Moderate	Slight	American basswood	---	---	White spruce
						Bigtooth aspen	76	86	
						Black cherry	---	---	
						Northern red oak	63	57	
						Paper birch	---	---	
						Quaking aspen	74	86	
						Red pine	62	114	
						Sugar maple	---	---	
						White ash	77	72	
						White oak	77	72	
Curtisville	3	Slight	Moderate	Slight	Slight	American basswood	---	---	Norway spruce, eastern white pine, red pine, white spruce
						American beech	---	---	
						Black cherry	---	---	
						Northern red oak	---	---	
						Quaking aspen	---	---	
						Sugar maple	61	43	
						White ash	---	---	
						White oak	---	---	
473:									
Deford	4W	Slight	Severe	Severe	Severe	American basswood	---	---	Eastern white pine, white spruce
						Balsam fir	---	---	
						Northern whitecedar	---	---	
						Quaking aspen	60	57	
						Red maple	64	43	
Kinross	2W	Slight	Severe	Severe	Severe	Black spruce	15	29	Quaking aspen
						Jack pine	---	---	
474.									
Histosols-Fluvaquents									

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
475B:									
Graycalm----------------	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, red pine
						Jack pine-----------	56	86	
						Northern pin oak----	---	---	
						Northern red oak----	62	57	
						Quaking aspen-------	60	57	
						Red maple-----------	---	---	
						Red pine------------	61	100	
Klacking----------------	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, red pine
						Black cherry--------	---	---	
						Jack pine-----------	---	---	
						Northern pin oak----	---	---	
						Northern red oak----	60	57	
						Quaking aspen-------	---	---	
						Red maple-----------	---	---	
						Red pine------------	---	---	
						White oak-----------	57	43	
475D:									
Graycalm----------------	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, red pine
						Jack pine-----------	56	86	
						Northern pin oak----	---	---	
						Northern red oak----	62	57	
						Quaking aspen-------	60	57	
						Red maple-----------	---	---	
						Red pine------------	61	100	
Klacking----------------	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, red pine
						Black cherry--------	---	---	
						Jack pine-----------	---	---	
						Northern pin oak----	---	---	
						Northern red oak----	60	57	
						Quaking aspen-------	---	---	
						Red maple-----------	---	---	
						Red pine------------	---	---	
						White oak-----------	57	43	
475E:									
Graycalm----------------	6R	Moderate	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, red pine
						Jack pine-----------	56	86	
						Northern pin oak----	---	---	
						Northern red oak----	62	57	
						Quaking aspen-------	60	57	
						Red maple-----------	---	---	
						Red pine------------	61	100	
Klacking----------------	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen------	70	86	Eastern white pine, red pine
						Black cherry--------	---	---	
						Jack pine-----------	---	---	
						Northern pin oak----	---	---	
						Northern red oak----	60	57	
						Quaking aspen-------	---	---	
						Red maple-----------	---	---	
						Red pine------------	---	---	
						White oak-----------	57	43	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
476B:									
Klacking	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	70	86	Eastern white pine, red pine
						Black cherry	---	---	
						Jack pine	---	---	
						Northern pin oak	---	---	
						Northern red oak	60	57	
						Quaking aspen	---	---	
						Red maple	---	---	
						Red pine	---	---	
						White oak	57	43	
Perecheney	6S	Slight	Moderate	Moderate	Slight	Balsam fir	---	---	Eastern white pine, red pine, white spruce
						Black cherry	---	---	
						Eastern white pine	---	---	
						Jack pine	---	---	
						Northern red oak	---	---	
						Quaking aspen	70	86	
						Red maple	---	---	
						Red pine	---	---	
						White oak	---	---	
476D:									
Klacking	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	70	86	Eastern white pine, red pine
						Black cherry	---	---	
						Jack pine	---	---	
						Northern pin oak	---	---	
						Northern red oak	60	57	
						Quaking aspen	---	---	
						Red maple	---	---	
						Red pine	---	---	
						White oak	57	43	
Perecheney	6S	Slight	Moderate	Moderate	Slight	Balsam fir	---	---	Eastern white pine, red pine, white spruce
						Black cherry	---	---	
						Eastern white pine	---	---	
						Jack pine	---	---	
						Northern red oak	---	---	
						Quaking aspen	70	86	
						Red maple	---	---	
						Red pine	---	---	
						White oak	---	---	
490. Urban land-Aquents									
491A:									
Geels	3A	Slight	Slight	Slight	Slight	Black oak	---	---	Eastern white pine, red pine, white spruce
						Eastern white pine	---	---	
						Jack pine	---	---	
						Northern red oak	---	---	
						Paper birch	---	---	
						Quaking aspen	70	81	
						Red maple	---	---	
						Red pine	---	---	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
492:									
Allendale, sandy substratum	4W	Slight	Severe	Moderate	Moderate	American beech	---	---	Eastern white pine, white spruce
						Balsam fir	---	---	
						Eastern hemlock	---	---	
						Eastern white pine	---	---	
						Quaking aspen	60	57	
						Red maple	---	---	
						Sugar maple	---	---	
						White spruce	---	---	
493A:									
Otisco	4W	Slight	Severe	Moderate	Severe	American elm	---	---	Eastern white pine, northern whitecedar, white spruce
						Balsam fir	---	---	
						Bigtooth aspen	65	72	
						Jack pine	53	72	
						Quaking aspen	60	57	
						Red maple	---	---	
						White spruce	---	---	
						Yellow birch	---	---	
495B:									
Gerrish	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	70	86	Eastern white pine, jack pine, red pine
						Jack pine	---	---	
						Northern red oak	---	57	
						Paper birch	---	---	
						Quaking aspen	---	57	
						Red pine	---	---	
495D:									
Gerrish	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	70	86	Eastern white pine, jack pine, red pine
						Jack pine	---	---	
						Northern red oak	---	57	
						Paper birch	---	---	
						Quaking aspen	---	57	
						Red pine	---	---	
495F:									
Gerrish	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	70	86	Eastern white pine, jack pine, red pine
						Jack pine	---	---	
						Northern red oak	---	57	
						Paper birch	---	---	
						Quaking aspen	---	57	
						Red pine	---	---	
496B:									
Gerrish	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	70	86	Eastern white pine, jack pine, red pine
						Jack pine	---	---	
						Northern red oak	---	57	
						Paper birch	---	---	
						Quaking aspen	---	57	
						Red pine	---	---	
Grayling	4S	Slight	Moderate	Moderate	Slight	Jack pine	48	57	Jack pine, red pine
						Northern pin oak	43	29	
						Quaking aspen	---	---	
						Red pine	---	---	
						White oak	---	---	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
								cu ft/ac	
496D:									
Gerrish	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	70	86	Eastern white pine, jack pine, red pine
						Jack pine	---	---	
						Northern red oak	---	57	
						Paper birch	---	---	
						Quaking aspen	---	57	
						Red pine	---	---	
Grayling	4S	Slight	Moderate	Moderate	Slight	Jack pine	48	57	Jack pine, red pine
						Northern pin oak	43	29	
						Quaking aspen	---	---	
						Red pine	---	---	
						White oak	---	---	
496F:									
Gerrish	6S	Slight	Moderate	Moderate	Slight	Bigtooth aspen	70	86	Eastern white pine, jack pine, red pine
						Jack pine	---	---	
						Northern red oak	---	57	
						Paper birch	---	---	
						Quaking aspen	---	57	
						Red pine	---	---	
Grayling	4S	Slight	Moderate	Moderate	Slight	Jack pine	48	57	Jack pine, red pine
						Northern pin oak	43	29	
						Quaking aspen	---	---	
						Red pine	---	---	
						White oak	---	---	
497A:									
Debolt	3	Slight	Moderate	Slight	Slight	American basswood	---	---	Austrian pine, eastern white pine, jack pine, red pine
						Black cherry	---	---	
						Northern red oak	---	---	
						Quaking aspen	---	---	
						Sugar maple	60	43	
						White ash	---	---	
498A:									
Pinewood	3W	Slight	Severe	Slight	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
						Black cherry	---	---	
						Quaking aspen	60	---	
						Red pine	---	---	
499:									
Dawson	2W	Slight	Severe	Severe	Severe	Black spruce	15	29	---
						Tamarack	---	---	
Kinross	2W	Slight	Severe	Severe	Severe	Black spruce	15	29	Quaking aspen
						Jack pine	---	---	
500A:									
Flink	6W	Slight	Severe	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
						Eastern white pine	---	---	
						Paper birch	---	---	
						Quaking aspen	---	---	
						Red maple	---	---	
						Red pine	56	86	

Table 7.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
								cu ft/ac	
501B:									
Kellogg, sandy substratum	3S	Slight	Moderate	Moderate	Slight	Balsam fir	---	---	Eastern white pine, red pine
						Black cherry	---	---	
						Eastern hemlock	---	---	
						Jack pine	---	---	
						Northern red oak	56	43	
						Quaking aspen	67	43	
						Red pine	---	---	
502B:									
Kawkawlin	3W	Slight	Severe	Slight	Moderate	American basswood	---	---	Norway spruce, eastern white pine, red pine, white spruce
						Bigtooth aspen	---	---	
						Northern red oak	---	---	
						Quaking aspen	---	---	
						Red maple	---	---	
						Sugar maple	60	43	
						Swamp white oak	---	---	
						White ash	---	---	
Sims	4W	Slight	Severe	Severe	Severe	American basswood	---	---	---
						Balsam fir	---	---	
						Bigtooth aspen	57	57	
						Black spruce	---	---	
						Northern whitecedar	---	---	
						Quaking aspen	---	---	
						White ash	---	---	

Table 8.--Equipment Limitations on Forestland

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of other terms used in this table. Absence of an entry indicates that the soil was not rated)

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
13:							
Tawas	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Lupton	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
14:							
Dawson	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Loxley	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
15A:							
Croswell	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Summer, fall, winter.	Slight	Slight	Slight.
Au Gres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
16B Graycalm	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
17A Croswell	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Summer, fall, winter.	Slight	Slight	Slight.
18A Au Gres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
20B:							
Graycalm	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.

Table 8.--Equipment Limitations on Forestland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
20B:							
Grayling	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
20D:							
Graycalm	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Grayling	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
20F:							
Graycalm	Moderate*: too sandy, slope.	Severe: slope.	Moderate*: too sandy, slope.	Spring, fall, winter.	Moderate*: slope.	Severe: slope.	Moderate*: slope.
Grayling	Moderate*: too sandy, slope.	Severe: slope.	Moderate*: too sandy, slope.	Spring, fall, winter.	Moderate*: slope.	Severe: slope.	Moderate*: slope.
23:							
Ausable	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Bowstring	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
24A:							
Kinross	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
Au Gres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
26B Cublake	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
34B Kneff	Severe: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, winter	Slight	Slight	Slight.

See footnote at end of table.

Table 8.--Equipment Limitations on Forestland--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
35: Kinross	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
47D: Graycalm	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
47F: Graycalm	Moderate*: too sandy, slope.	Severe: slope.	Moderate*: too sandy, slope.	Spring, fall, winter.	Moderate*: slope.	Severe: slope.	Moderate*: slope.
50B:							
Au Gres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
Kinross	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
Croswell	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
51:							
Tawas	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Leafriver	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
57B: Kawkawlin	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
58A:							
Wakeley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
Allendale	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.

See footnote at end of table.

Table 8.--Equipment Limitations on Forestland--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
67A:							
Bowers	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
Deerheart	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
75B Rubicon	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
75D Rubicon	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
78. Pits							
81B Grayling	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
81D Grayling	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
81F Grayling	Moderate*: too sandy, slope.	Severe: slope.	Moderate*: too sandy, slope.	Spring, fall, winter.	Moderate*: slope.	Severe: slope.	Moderate*: slope.
82B. Udorthents							
83B, 83F. Udipsamments							
86. Histosols and Aquents							
87 Ausable	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Severe: low strength.

See footnote at end of table.

Table 8.--Equipment Limitations on Forestland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
90B-- Chinwhisker	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
102D-- Curtisville	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, winter	Slight	Moderate: slope.	Slight.
103B-- Nester	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, winter	Slight	Slight	Slight.
103C-- Nester	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, winter	Slight	Moderate: slope.	Slight.
114A-- Ingalls	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
120B-- Morganlake	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
120C-- Morganlake	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
123D-- Klacking	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
144B-- Perecheney	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
144C-- Perecheney	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
159A-- Finch	Severe: wetness.	Severe: wetness.	Severe: wetness.	Winter, summer	Slight	Slight	Slight.
307B-- Klacking	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.

See footnote at end of table.

Table 8.--Equipment Limitations on Forestland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
307E-------------- Klacking	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate**. slope.	Severe: slope.	Moderate*: slope.
360--------------- Wakeley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight--------	Slight--------	Slight.
368A:							
Au Gres----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight--------	Slight--------	Slight.
Deford-----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight--------	Slight--------	Slight.
369--------------- Deford	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight--------	Slight--------	Slight.
380. Access denied							
382B-------------- Proper	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight--------	Slight--------	Slight.
408--------------- Sims	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight--------	Slight--------	Slight.
410B:							
Proper-----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight--------	Slight--------	Slight.
Finch------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Winter, summer	Slight--------	Slight--------	Slight.
Deford-----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight--------	Slight--------	Slight.
429D-------------- Menominee	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight--------	Moderate: slope.	Slight.

See footnote at end of table.

Table 8.--Equipment Limitations on Forestland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
441B:							
Morganlake	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
Nester	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Spring, fall, winter.	Slight	Slight	Slight.
441C:							
Morganlake	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Nester	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
442D:							
Menominee	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Curtisville	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, winter	Slight	Moderate: slope.	Slight.
473:							
Deford	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
Kinross	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
474. Histosols-Fluvaquents							
475B:							
Graycalm	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
Klacking	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.

See footnote at end of table.

Table 8.--Equipment Limitations on Forestland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
475D:							
Graycalm	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Klacking	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
475E:							
Graycalm	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy, slope.	Spring, fall, winter.	Moderate*: slope.	Severe: slope.	Moderate: slope.
Klacking	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy, slope.	Spring, fall, winter.	Moderate*: slope.	Severe: slope.	Moderate: slope.
476B:							
Klacking	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
Perecheney	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
476D:							
Klacking	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Perecheney	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
490. Urban land-Aquents							
491A Geels	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
492A Allendale, sandy substratum	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.

See footnote at end of table.

Table 8.--Equipment Limitations on Forestland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
493A-------------- Otisco	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight--------	Slight--------	Slight.
495B-------------- Gerrish	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight--------	Slight--------	Slight.
495D-------------- Gerrish	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight--------	Moderate: slope.	Slight.
495F-------------- Gerrish	Moderate*: too sandy, slope.	Severe: slope.	Moderate*: too sandy, slope.	Spring, fall, winter.	Moderate*: slope.	Severe: slope.	Moderate*: slope.
496B:							
Gerrish----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight--------	Slight--------	Slight.
Grayling---------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight--------	Slight--------	Slight.
496D:							
Gerrish----------	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight--------	Moderate: slope.	Slight.
Grayling---------	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight--------	Moderate: slope.	Slight.
496F:							
Gerrish----------	Moderate*: too sandy, slope.	Severe: slope.	Moderate*: too sandy, slope.	Spring, fall, winter.	Moderate*: slope.	Severe: slope.	Moderate*: slope.
Grayling---------	Moderate*: too sandy, slope.	Severe: slope.	Moderate*: too sandy, slope.	Spring, fall, winter.	Moderate*: slope.	Severe: slope.	Moderate*: slope.
497A-------------- Debolt	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, winter	Slight--------	Slight--------	Slight.

See footnote at end of table.

Table 8.--Equipment Limitations on Forestland--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
498A-------------- Pinewood	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight--------	Slight--------	Slight.
499:							
Dawson-----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---------	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Kinross----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight--------	Slight--------	Slight.
500A. Flink							
501B-------------- Kellogg, sandy substratum	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight--------	Slight--------	Slight.
502B:							
Kawkawlin--------	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight--------	Slight--------	Slight.
Sims-------------	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight--------	Slight--------	Slight.

* A rating of severe may be applicable in some areas.

Table 9.--Plant Communities on Selected Soils

(Absence of an entry indicates that information was not available)

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
13--------------------	N. white cedar ---- 4	Balsam fir -------- 3	Speckled alder ---- 3	Lady fern --------- 4	Sphagnum moss ------ 5
Tawas-Lupton	Balsam poplar ----- 3	Red maple --------- 2	Redosier dogwood -- 2	Oak fern ---------- 4	Yellow beadlily ---- 3
	Balsam fir -------- 3	N. white cedar ---- 2		Cinnamon fern ----- 3	Bugleweed ---------- 3
	Black spruce ------ 3	Black spruce ------ 2		Crested fern ------ 3	Bunchberry --------- 3
	Tamarack ---------- 3	Green ash --------- 1		Sensitive fern ---- 3	Dewberry ----------- 3
	Green ash --------- 2	Balsam poplar ----- 1		Royal fern -------- 2	Gay wings ---------- 3
	Red maple --------- 2	Paper birch ------- 1		Shield fern ------- 2	Goldthread --------- 3
	E. white pine ----- 2	E. white pine ----- 1		Rattlesnake fern -- 1	Grass spp. --------- 3
	Quaking aspen ----- 1				Labrador tea ------- 3
	Paper birch ------- 1			Ground cedar ------ 3	Nightshade --------- 3
				Shining clubmoss -- 3	Starflower --------- 3
				Stiff clubmoss ---- 3	Twinflower --------- 3
				Ground pine ------- 2	Violet spp. -------- 3
					Creeping wintergreen 3
					Bedstraw/cleavers -- 2
					Canada blueberry --- 2
					Low bush blueberry - 2
					Bramble spp. ------- 2
					Pale laurel -------- 2
					Miterwort spp. ----- 2
					Pyrola spp. -------- 2
					Sedge spp. --------- 2
					Solomon's seal ----- 2
					Canada mayflower --- 2
					Wild sarsaparilla -- 2
					Woodsorrel --------- 2
					Blueflag ----------- 1
					Jack-in-the-pulpit - 1
					Marsh marigold ----- 1
					Partridgeberry ----- 1
					Smooth yellow violet 1
14--------------------	Tamarack ---------- 3	Tamarack ---------- 3	Leatherleaf ------- 6		Sphagnum moss ------ 7
Dawson-Loxley	Paper birch ------- 2	Black spruce ------ 2	Redosier dogwood -- 3		Pale laurel -------- 3
	Jack pine --------- 2	Jack pine --------- 2	Speckled alder ---- 3		Labrador tea ------- 3
	Red pine ---------- 1	E. white pine ----- 1			Canada blueberry --- 2
	E. white pine ----- 1	Red pine ---------- 1			Low bush blueberry - 2
	Black spruce ------ 1				Bog rosemary ------- 2
					Goldthread --------- 2
					Grass spp. --------- 2
					Sedge spp. --------- 2
					Bunchberry --------- 1
					Cranberry spp. ----- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
15A:					
Croswell	Jack pine --------- 4	Black cherry ------ 3	Serviceberry ------ 3	Bracken fern ------ 4	Low bush blueberry - 4
	Red pine --------- 4	Black oak --------- 3			Huckleberry -------- 4
	Quaking aspen ----- 3	White oak --------- 3		Stiff clubmoss ---- 2	Grass spp. --------- 4
	E. white pine ----- 3	Northern red oak -- 3		Ground pine ------- 2	Sedge spp. --------- 4
	Black oak --------- 3	Black oak --------- 3		Staghorn clubmoss - 1	Bearberry ---------- 3
	Northern red oak -- 3	Jack pine --------- 3			Canada blueberry --- 3
	Bigtooth aspen ---- 2	E. white pine ----- 2			Bunchberry --------- 3
	Paper birch ------- 2	Red maple --------- 2			Dewberry ----------- 3
	Black cherry ------ 2	Bigtooth aspen ---- 2			Reindeer lichen ---- 3
	Balsam fir -------- 2	Quaking aspen ----- 2			Wintergreen -------- 3
	White oak --------- 2	White spruce ------ 1			Canada mayflower --- 3
	Red maple --------- 1	Balsam fir -------- 1			Blue cladonia ------ 2
		Red pine ---------- 1			Starflower --------- 2
					Sweetfern ---------- 2
					Large leaf aster --- 1
					Pink lady slipper -- 1
					Trailing arbutus --- 1
Au Gres	Quaking aspen ----- 3	Red maple --------- 3	Leatherleaf ------- 3	Bracken fern ------ 4	Dewberry ----------- 4
	Red maple --------- 3	Black cherry ------ 2	Speckled alder ---- 2		Grass spp. --------- 4
	Jack pine --------- 3	Black oak --------- 2	Serviceberry ------ 2		Wood anemone ------- 3
	Black spruce ------ 3	E. white pine ----- 2	Northern bush		Canada blueberry --- 3
	Paper birch ------- 2	Quaking aspen ----- 1	honeysuckle ------ 1		Low bush blueberry - 3
	Black cherry ------ 2	Balsam fir -------- 1	Honeysuckle spp. -- 1		Gay wings ---------- 3
	Red pine ---------- 2				Sedge spp. --------- 3
	Black oak --------- 2				Wintergreen -------- 3
	E. white pine ----- 2				Canada mayflower --- 2
	White spruce ------ 1				Large leaf aster --- 2
	Tamarack ---------- 1				Bramble spp. ------- 2
					Sweetfern ---------- 1
					Starflower --------- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
16B-------------------	Bigtooth aspen ---- 4	Bigtooth aspen ---- 4	Witch hazel ------- 3	Bracken fern ------ 5	Sedge spp. --------- 4
Graycalm	Pin cherry -------- 4	Quaking aspen ----- 4	Serviceberry ------ 2		Grass spp. --------- 3
	Black oak --------- 4	Black oak --------- 4	Maple leaf	Ground cedar ------ 3	Low bush blueberry - 3
	Quaking aspen ----- 3	Northern red oak -- 3	viburnum --------- 1	Staghorn clubmoss - 1	Bearberry ---------- 3
	Black cherry ------ 3	White oak --------- 3	Hawthorn spp. ----- 1		Hawkweed spp. ------ 3
	Jack pine --------- 3	Red maple --------- 3			Sweetfern ---------- 3
	Red maple --------- 3	Black cherry ------ 2			Wintergreen -------- 3
	Northern red oak -- 3	Jack pine --------- 2			Huckleberry -------- 3
	White oak --------- 3	Balsam fir -------- 1			Bramble spp. ------- 3
	E. white pine ----- 2	E. white pine ----- 1			Cow wheat ---------- 2
	Choke cherry ------ 2	Red pine ---------- 1			Large leaf aster --- 2
	Red pine ---------- 1				Bluet spp. --------- 2
					Bellwort spp. ------ 1
					Reindeer lichen ---- 1
					Canada mayflower --- 1
17A-------------------	Jack pine --------- 4	Black cherry ------ 3	Serviceberry ------ 3	Bracken fern ------ 4	Low bush blueberry - 4
Croswell	Red pine ---------- 4	Black oak --------- 3			Huckleberry -------- 4
	Quaking aspen ----- 3	White oak --------- 3		Stiff clubmoss ---- 2	Grass spp. --------- 4
	E. white pine ----- 3	Northern red oak -- 3		Ground pine ------- 2	Sedge spp. --------- 4
	Black oak --------- 3	Black oak --------- 3		Staghorn clubmoss - 1	Bearberry ---------- 3
	Northern red oak -- 3	Jack pine --------- 3			Canada blueberry --- 3
	Bigtooth aspen ---- 2	E. white pine ----- 2			Bunchberry --------- 3
	Paper birch ------- 2	Red maple --------- 2			Dewberry ----------- 3
	Black cherry ------ 2	Bigtooth aspen ---- 2			Reindeer lichen ---- 3
	Balsam fir -------- 2	Quaking aspen ----- 2			Wintergreen -------- 3
	White oak --------- 2	White spruce ------ 1			Canada mayflower --- 3
	Red maple --------- 1	Balsam fir -------- 1			Blue cladonia ------ 2
		Red pine ---------- 1			Starflower --------- 2
					Sweetfern ---------- 2
					Large leaf aster --- 1
					Pink lady slipper -- 1
					Trailing arbutus --- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
18A-------------------	Quaking aspen ----- 3	Red maple --------- 3	Leatherleaf ------- 3	Bracken fern ------ 4	Dewberry ----------- 4
Au Gres	Red maple --------- 3	Black cherry ------ 2	Speckled alder ---- 2		Grass spp. --------- 4
	Jack pine --------- 3	Black oak --------- 2	Serviceberry ------ 2		Wood anemone ------- 3
	Black spruce ------ 3	E. white pine ----- 2	Northern bush		Canada blueberry --- 3
	Paper birch ------- 2	Quaking aspen ----- 1	honeysuckle ------ 1		Low bush blueberry - 3
	Black cherry ------ 2	Balsam fir -------- 1	Honeysuckle spp. -- 1		Gay wings ---------- 3
	Red pine ---------- 2				Sedge spp. --------- 3
	Black oak --------- 2				Wintergreen -------- 3
	E. white pine ----- 2				Canada mayflower --- 2
	White spruce ------ 1				Large leaf aster --- 2
	Tamarack ---------- 1				Bramble spp. ------- 2
					Sweetfern ---------- 1
					Starflower --------- 1
20B, 20D, 20F----------	Northern red oak -- 3	Red maple --------- 3	Witch hazel ------- 3	Bracken fern ------ 4	Grass spp. --------- 4
Graycalm-Grayling	Bigtooth aspen ---- 3	American beech ---- 2	Serviceberry ------ 2		Wintergreen -------- 3
	Red maple --------- 3	Bigtooth aspen ---- 2	Maple leaf	Ground cedar ------ 3	Low bush blueberry - 3
	Quaking aspen ----- 2	Black cherry	viburnum --------- 1	Stiff clubmoss ---- 3	Gay wings ---------- 3
	Paper birch ------- 2	Northern red oak -- 2	Beaked hazelnut --- 1		Reindeer lichen ---- 3
	Black cherry ------ 2	White oak --------- 2			Sweetfern ---------- 3
	White oak --------- 2	Balsam fir -------- 2			Canada blueberry --- 2
	Jack pine --------- 2	E. white pine ----- 2			Blue cladonia ------ 2
	Red pine ---------- 2	Jack pine --------- 2			Rosy twisted stalk - 2
	Black oak --------- 1	Red pine ---------- 2			Canada mayflower --- 2
	E. white pine ----- 1	White spruce ------ 2			Sedge spp. --------- 2
		Quaking aspen ----- 1			Large leaf aster --- 1
		Paper birch ------- 1			Huckleberry -------- 1
23--------------------	N. white cedar ---- 2	Balsam fir -------- 1	Speckled alder ---- 5	Sensitive fern ---- 2	Grass spp. --------- 6
Ausable-Bowstring	Tamarack ---------- 2	Red maple --------- 1	Redosier dogwood -- 1	Shield fern ------- 2	Sedge spp. --------- 4
	Paper birch ------- 1		Meadow-sweet ------ 1	Crested fern ------ 1	Bedstraw spp. ------ 3
	Red maple --------- 1			Marsh fern -------- 1	Virgin's bower ----- 3
	E. white pine ----- 1				Bugleweed ---------- 2
	Black spruce ------ 1				Dewberry ----------- 2
					Jewelweed ---------- 2
					Joe-Pye-weed spp. -- 2
					Meadow-rue spp. ---- 2
					Blueflag ----------- 1
					Bramble spp. ------- 1
					Mint spp. ---------- 1
					Swamp milkweed ----- 1
					Currant/gooseberry - 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
24A:					
Kinross--------------	Quaking aspen ----- 3	Red maple --------- 3	Leatherleaf ------- 1	Bracken fern ------ 3	Bunchberry --------- 3
	Red maple --------- 3	E. white pine ----- 3		Cinnamon fern ----- 2	Yellow beadlily ---- 3
	Balsam fir -------- 3	Paper birch ------- 2			Low bush blueberry - 3
	Black spruce ------ 3	Black oak --------- 2		Shining clubmoss -- 3	Labrador tea ------- 3
	E. white pine ----- 3	Black spruce ------ 2		Running pine ------ 2	Sphagnum moss ------ 3
	N. white cedar ---- 2	Black ash --------- 1			Sedge spp. --------- 3
	Black ash --------- 2	White oak --------- 1			Canada mayflower --- 3
	Paper birch ------- 2	Balsam fir -------- 1			Wintergreen -------- 3
	Northern red oak -- 2				Grass spp. --------- 2
	Jack pine --------- 2				Starflower --------- 2
	White spruce ------ 2				Goldthread --------- 2
	Bigtooth aspen ---- 1				Nettle spp. -------- 2
	Black cherry ------ 1				Partridgeberry ----- 2
	Red pine ---------- 1				Huckleberry -------- 1
	Tamarack ---------- 1				Canada blueberry --- 1
					Cow wheat ---------- 1
					Creeping wintergreen 1
					Dewberry ----------- 1
					Indian cucumber-root 1
					Trailing arbutus --- 1
Au Gres--------------	Quaking aspen ----- 3	Red maple --------- 3	Leatherleaf ------- 3	Bracken fern ------ 4	Dewberry ----------- 4
	Red maple --------- 3	Black cherry ------ 2	Speckled alder ---- 2		Grass spp. --------- 4
	Jack pine --------- 3	Black oak --------- 2	Serviceberry ------ 2		Wood anemone ------- 3
	Black spruce ------ 3	E. white pine ----- 2	Northern bush		Canada blueberry --- 3
	Paper birch ------- 2	Quaking aspen ----- 1	honeysuckle ------ 1		Low bush blueberry - 3
	Black cherry ------ 2	Balsam fir -------- 1	Honeysuckle spp. -- 1		Gay wings ---------- 3
	Red pine ---------- 2				Sedge spp. --------- 3
	Black oak --------- 2				Wintergreen -------- 3
	E. white pine ----- 2				Canada mayflower --- 2
	White spruce ------ 1				Large leaf aster --- 2
	Tamarack ---------- 1				Bramble spp. ------- 2
					Sweetfern ---------- 1
					Starflower --------- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
26B--------------------	Bigtooth aspen ---- 4	Quaking aspen ----- 3	Northern bush	Bracken fern ------ 6	Wintergreen -------- 4
Cublake	Quaking aspen ----- 3	Black cherry ------ 3	honeysuckle ------ 1		Low bush blueberry - 3
	Red pine ---------- 3	Red maple --------- 2	Serviceberry ------ 1	Ground cedar ------ 1	Gay wings ---------- 3
	E. white pine ----- 2	Black oak --------- 2		Stiff clubmoss ---- 1	Grass spp. --------- 3
	Balsam fir -------- 2	Balsam fir -------- 2			Canada blueberry --- 2
	Jack pine --------- 2	E. white pine ----- 2			Cow wheat ---------- 2
	Black cherry ------ 1	Jack pine --------- 2			Starflower --------- 2
	Black oak --------- 1	Red pine ---------- 1			Sweetfern ---------- 2
		White oak --------- 1			Canada mayflower --- 2
					Large leaf aster --- 1
					Bramble spp. ------- 1
					Bunchberry --------- 1
					Partridgeberry ----- 1
					Pink lady slipper -- 1
					Pyrola spp. -------- 1
					Reindeer lichen ---- 1
					Trailing arbutus --- 1
					Prince pine -------- 1
34B.					
Kneff					
35---------------------	Quaking aspen ----- 3	Red maple --------- 3	Leatherleaf ------- 1	Bracken fern ------ 3	Bunchberry --------- 3
Kinross	Red maple --------- 3	E. white pine ----- 3		Cinnamon fern ----- 2	Yellow beadlily ---- 3
	Balsam fir -------- 3	Paper birch ------- 2			Low bush blueberry - 3
	Black spruce ------ 3	Black oak --------- 2		Shining clubmoss -- 3	Labrador tea ------- 3
	E. white pine ----- 3	Black spruce ------ 2		Running pine ------ 2	Sphagnum moss ------ 3
	N. white cedar ---- 2	Black ash --------- 1			Sedge spp. --------- 3
	Black ash --------- 2	White oak --------- 1			Canada mayflower --- 3
	Paper birch ------- 2	Balsam fir -------- 1			Wintergreen -------- 3
	Northern red oak -- 2				Grass spp. --------- 2
	Jack pine --------- 2				Starflower --------- 2
	White spruce ------ 2				Goldthread --------- 2
	Bigtooth aspen ---- 1				Nettle spp. -------- 2
	Black cherry ------ 1				Partridgeberry ----- 2
	Red pine ---------- 1				Huckleberry -------- 1
	Tamarack ---------- 1				Canada blueberry --- 1
					Cow wheat ---------- 1
					Creeping wintergreen 1
					Dewberry ----------- 1
					Indian cucumber-root 1
					Trailing arbutus --- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
47D, 47F---------------	Bigtooth aspen ---- 4	Bigtooth aspen ---- 4	Witch hazel ------- 3	Bracken fern ------ 5	Sedge spp. --------- 4
Graycalm	Pin cherry -------- 4	Quaking aspen ----- 4	Serviceberry ------ 2		Grass spp. --------- 3
	Black oak --------- 4	Black oak --------- 4	Maple leaf	Ground cedar ------ 3	Low bush blueberry - 3
	Quaking aspen ----- 3	Northern red oak -- 3	viburnum --------- 1	Staghorn clubmoss - 1	Bearberry ---------- 3
	Black cherry ------ 3	White oak --------- 3	Hawthorn spp. ----- 1		Hawkweed spp. ------ 3
	Jack pine --------- 3	Red maple --------- 3			Sweetfern ---------- 3
	Red maple --------- 3	Black cherry ------ 2			Wintergreen -------- 3
	Northern red oak -- 3	Jack pine --------- 2			Huckleberry -------- 3
	White oak --------- 3	Balsam fir -------- 1			Bramble spp. ------- 3
	Hophornbeam ------- 2	E. white pine ----- 1			Cow wheat ---------- 2
	Choke cherry ------ 2	Red pine ---------- 1			Large leaf aster --- 2
	E. white pine ----- 2				Bluet spp. --------- 2
	Red pine ---------- 1				Bellwort spp. ------ 1
					Reindeer lichen ---- 1
					Canada mayflower --- 1
50B:					
Au Gres---------------	Quaking aspen ----- 3	Red maple --------- 3	Leatherleaf ------- 3	Bracken fern ------ 4	Dewberry ----------- 4
	Red maple --------- 3	Black cherry ------ 2	Speckled alder ---- 2		Grass spp. --------- 4
	Jack pine --------- 3	Black oak --------- 2	Serviceberry ------ 2		Wood anemone ------- 3
	Black spruce ------ 3	E. white pine ----- 2	Northern bush		Canada blueberry --- 3
	Paper birch ------- 2	Quaking aspen ----- 1	honeysuckle ------ 1		Low bush blueberry - 3
	Black cherry ------ 2	Balsam fir -------- 1	Honeysuckle spp. -- 1		Gay wings ---------- 3
	Red pine ---------- 2				Sedge spp. --------- 3
	Black oak --------- 2				Wintergreen -------- 3
	E. white pine ----- 2				Canada mayflower --- 2
	White spruce ------ 1				Large leaf aster --- 2
	Tamarack ---------- 1				Bramble spp. ------- 2
					Sweetfern ---------- 1
					Starflower --------- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
50B:					
Kinross--------------	Quaking aspen ----- 3	Red maple --------- 3	Leatherleaf ------- 1	Bracken fern ------ 3	Bunchberry --------- 3
	Red maple --------- 3	E. white pine ----- 3		Cinnamon fern ----- 2	Yellow beadlily ---- 3
	Balsam fir -------- 3	Paper birch ------- 2			Low bush blueberry - 3
	Black spruce ------ 3	Black oak --------- 2		Shining clubmoss -- 3	Labrador tea ------- 3
	E. white pine ----- 3	Black spruce ------ 2		Running pine ------ 2	Sphagnum moss ------ 3
	N. white cedar ---- 2	Black ash --------- 1			Sedge spp. --------- 3
	Black ash --------- 2	White oak --------- 1			Canada mayflower --- 3
	Paper birch ------- 2	Balsam fir -------- 1			Wintergreen -------- 3
	Northern red oak -- 2				Grass spp. --------- 2
	Jack pine --------- 2				Starflower --------- 2
	White spruce ------ 2				Goldthread --------- 2
	Bigtooth aspen ---- 1				Nettle spp. -------- 2
	Black cherry ------ 1				Partridgeberry ----- 2
	Red pine ---------- 1				Huckleberry -------- 1
	Tamarack ---------- 1				Canada blueberry --- 1
					Cow wheat ---------- 1
					Creeping wintergreen 1
					Dewberry ----------- 1
					Indian cucumber-root 1
					Trailing arbutus --- 1
Croswell-------------	Jack pine --------- 4	Black cherry ------ 3	Serviceberry ------ 3	Bracken fern ------ 4	Low bush blueberry - 4
	Red pine ---------- 4	Black oak --------- 3			Huckleberry -------- 4
	Quaking aspen ----- 3	White oak --------- 3		Stiff clubmoss ---- 2	Grass spp. --------- 4
	E. white pine ----- 3	Northern red oak -- 3		Ground pine ------- 2	Sedge spp. --------- 4
	Black oak --------- 3	Black oak --------- 3		Staghorn clubmoss - 1	Bearberry ---------- 3
	Northern red oak -- 3	Jack pine --------- 3			Canada blueberry --- 3
	Bigtooth aspen ---- 2	E. white pine ----- 2			Bunchberry --------- 3
	Paper birch ------- 2	Red maple --------- 2			Dewberry ----------- 3
	Black cherry ------ 2	Bigtooth aspen ---- 2			Reindeer lichen ---- 3
	Balsam fir -------- 2	Quaking aspen ----- 2			Wintergreen -------- 3
	White oak --------- 2	White spruce ------ 1			Canada mayflower --- 3
	Red maple --------- 1	Balsam fir -------- 1			Blue cladonia ------ 2
		Red pine ---------- 1			Starflower --------- 2
					Sweetfern ---------- 2
					Large leaf aster --- 1
					Pink lady slipper -- 1
					Trailing arbutus --- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
51--------------------	N. white cedar ---- 4	Balsam fir -------- 3	Speckled alder ---- 3	Royal fern -------- 3	Sphagnum moss ------ 5
Tawas-Leafriver	Balsam fir -------- 3	Red maple --------- 2	Willow spp. ------- 2	Sensitive fern ---- 3	Goldthread --------- 4
	Black spruce ------ 3	N. white cedar ---- 2	Redosier dogwood -- 2		Bunchberry --------- 3
	Tamarack ---------- 3	Black spruce ------ 2			Grass spp. --------- 3
	Paper birch ------- 2	Green ash --------- 1			Sedge spp. --------- 3
	Red maple --------- 2	Balsam poplar ----- 1			Starflower --------- 3
	E. white pine ----- 2	Paper birch ------- 1			Yellow beadlily ---- 3
	Quaking aspen ----- 1	E. white pine ----- 1			Dewberry ----------- 3
					Twinflower --------- 3
					Violet spp. -------- 3
					Labrador tea ------- 2
					Creeping wintergreen 2
					Canada blueberry --- 2
					Low bush blueberry - 2
					Bramble spp. ------- 2
					Miterwort spp. ----- 2
					Solomon's seal ----- 2
					Wild sarsaparilla -- 2
					Woodsorrel --------- 2
					Blueflag ----------- 2
					Bugleweed ---------- 1
					Gay wings ---------- 1
					Nightshade --------- 1
					Pale laurel -------- 1
					Pyrola spp. -------- 1
					Jack-in-the-pulpit - 1
					Marsh marigold ----- 1
					Partridgeberry ----- 1
					Smooth yellow violet 1
					Goldenrod spp. ----- 1
					Cardinal flower ---- 1
57B.					
Kawkawlin					

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
58A:					
Wakeley---------------	Green ash --------- 3	Green ash --------- 3	Speckled alder ---- 4	Sensitive fern ---- 3	Grass spp. --------- 5
	Red maple --------- 3	Black ash --------- 2	Redosier dogwood -- 1	Bracken fern ------ 2	Sedge spp. --------- 3
	American basswood - 2	American basswood - 1		Oak fern ---------- 2	Bedstraw/cleavers -- 2
	Black ash --------- 2	Swamp white oak --- 1		Shield fern ------- 2	Bugleweed ---------- 2
	Eastern hemlock --- 2	American elm ------ 1		Cinnamon fern ----- 1	Dewberry ----------- 2
	N. white cedar ---- 2				Horsetail spp. ----- 2
	Balsam fir -------- 1				Jewelweed ---------- 2
	Silver maple ------ 1				Violet spp. -------- 2
	American elm ------ 1				Baneberry spp. ----- 1
					Bramble spp. ------- 1
					Jack-in-the-pulpit - 1
					Nettle spp. -------- 1
					Canada mayflower --- 1
					Wild sarsaparilla -- 1
					Wild strawberry ---- 1
					Wild grape spp. ---- 1
					Poison ivy --------- 1
					Bulrush spp. ------- 1
					Swamp milkweed ----- 1
					Water hemlock ------ 1
					Cardinal flower ---- 1
Allendale-------------	Quaking aspen ----- 4	Balsam fir -------- 3	Maple leaf	Bracken fern ------ 4	Grass spp. --------- 3
	Eastern hemlock --- 4	Red maple --------- 3	viburnum --------- 3		Wild sarsaparilla -- 3
	E. white pine ----- 3	American beech ---- 2	Serviceberry ------ 1	Ground pine ------- 3	Bunchberry --------- 3
	Sugar maple ------- 3	Black oak --------- 2		Shining clubmoss -- 2	Gay wings ---------- 3
	Balsam fir -------- 3	Black cherry ------ 1		Staghorn clubmoss - 1	Dewberry ----------- 2
	American beech ---- 3	Sugar maple ------- 1			Partridgeberry ----- 2
	Red maple --------- 2	Eastern hemlock --- 1			Starflower --------- 2
	Paper birch ------- 1	E. white pine ----- 1			Violet spp. -------- 2
	Red pine ---------- 1				Canada mayflower --- 2
					Large leaf aster --- 2
					Bedstraw/cleavers -- 2
					Canada blueberry --- 2
					Baneberry spp. ----- 1
					Yellow beadlily ---- 1
					White lettuce ------ 1
					False Solomon's seal 1
					Goldthread --------- 1
					Indian cucumber-root 1
					Twinflower --------- 1
					Wintergreen -------- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
67A. Bowers-Deerheart					
75B, 75D--------------- Rubicon	Bigtooth aspen ---- 3	Red maple --------- 4	Serviceberry ------ 1	Bracken fern ------ 5	Grass spp. --------- 6
	Balsam fir -------- 3	Bigtooth aspen ---- 2	Witch hazel ------- 1		Canada blueberry --- 3
	E. white pine ----- 3	Balsam fir -------- 2			Starflower --------- 3
	Red pine ---------- 3	E. white pine ----- 2			Canada mayflower --- 3
	Red maple --------- 2	Black cherry ------ 1			Wintergreen -------- 3
	Black oak --------- 2	Black oak --------- 1			Low bush blueberry - 2
	Jack pine --------- 2				Cow wheat ---------- 2
	Paper birch ------- 1				Bramble spp. ------- 1
	Black cherry ------ 1				
	White spruce ------ 1				
78. Pits					
81B, 81D--------------- Grayling	Jack pine --------- 5	Black oak --------- 4	Serviceberry ------ 1	Bracken fern ------ 4	Grass spp. --------- 5
	Black oak --------- 4	Northern red oak -- 3			Sedge spp. --------- 5
	Northern red oak -- 4	E. white pine ----- 3		Ground cedar ------ 3	Low bush blueberry - 4
	Black cherry ------ 3	Jack pine --------- 3			Partridgeberry ----- 3
	E. white pine ----- 3	Black cherry ------ 2			Wintergreen -------- 3
	Red maple --------- 3	Red maple --------- 2			Bearberry ---------- 3
	White oak --------- 3	White oak --------- 2			Bramble spp. ------- 2
	Red pine ---------- 2	Red pine ---------- 2			Cow wheat ---------- 2
	Bigtooth aspen ---- 1				Gay wings ---------- 2
					Hawkweed spp. ------ 2
					Pink lady slipper -- 2
					Reindeer lichen ---- 2
					Starflower --------- 2
					Sweetfern ---------- 2
					Violet spp. -------- 2
					Canada mayflower --- 2
					Wild strawberry ---- 2
					Canada blueberry --- 1
					Blue cladonia ------ 1
81F. Grayling					
82B. Udorthents					
83B, 83F. Udipsamments					

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
86. Histosols and Aquents					
87. Ausable	N. white cedar ---- 2	Balsam fir -------- 1	Speckled alder ---- 5	Sensitive fern ---- 2	Grass spp. --------- 6
	Tamarack ---------- 2	Red maple --------- 1	Redosier dogwood -- 1	Shield fern ------- 2	Sedge spp. --------- 4
	Paper birch ------- 1		Meadow-sweet ------ 1	Crested fern ------ 1	Bedstraw spp. ------ 3
	Red maple --------- 1			Marsh fern -------- 1	Virgin's bower ----- 3
	E. white pine ----- 1				Bugleweed ---------- 2
	Black spruce ------ 1				Dewberry ----------- 2
					Jewelweed ---------- 2
					Joe-Pye-weed spp. -- 2
					Meadow-rue spp. ---- 2
					Blueflag ----------- 1
					Bramble spp. ------- 1
					Mint spp. ---------- 1
					Swamp milkweed ----- 1
					Currant/gooseberry - 1
90B. Chinwhisker	Red pine ---------- 3	Red maple --------- 3	Serviceberry ------ 1	Bracken fern ------ 4	Low bush blueberry - 4
	Black cherry ------ 3	E. white pine ----- 3			Wintergreen -------- 3
	Red maple --------- 3	Northern red oak -- 3		Ground pine ------- 3	Canada blueberry --- 2
	Northern red oak -- 3	Black oak --------- 2		Stiff clubmoss ---- 2	Grass spp. --------- 2
	Jack pine --------- 3	Balsam fir -------- 1		Ground cedar ------ 1	Starflower --------- 2
	Paper birch ------- 3	Red pine ---------- 1			Sweetfern ---------- 2
	Balsam fir -------- 3	Quaking aspen ----- 1			Canada mayflower --- 2
	E. white pine ----- 2				Starflower --------- 2
	Quaking aspen ----- 2				Cow wheat ---------- 1
	White oak --------- 1				Pink lady slipper -- 1
	Bigtooth aspen ---- 1				Huckleberry -------- 1
	Eastern hemlock --- 1				
102D. Curtisville	Red maple --------- 4	White ash --------- 3	Witch hazel ------- 2	Bracken fern ------ 5	Low bush blueberry - 3
	American beech ---- 3	Hophornbeam ------- 2	Serviceberry ------ 2		Grass spp. --------- 3
	Paper birch ------- 3	Red maple --------- 2			Wintergreen -------- 2
	Sugar maple ------- 3	Sugar maple ------- 2			Trillium spp. ------ 2
	Northern red oak -- 3	E. white pine ----- 2			Canada blueberry --- 1
	White oak --------- 3	American beech ---- 1			Gay wings ---------- 1
	American basswood - 2	Bigtooth aspen ---- 1			Hepatica spp. ------ 1
	White ash --------- 2	Northern red oak -- 1			Rosy twisted stalk - 1
	Bigtooth aspen ---- 2	White oak --------- 1			Violet spp. -------- 1
	Hophornbeam ------- 2				
	Red pine ---------- 2				
	Quaking aspen ----- 1				
	Black cherry ------ 1				

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
103B, 103C-------------	Red maple --------- 4	White ash --------- 3	Witch hazel ------- 2	Bracken fern ------ 5	Low bush blueberry - 3
Nester	American beech ---- 3	Hophornbeam ------- 2	Serviceberry ------ 2		Grass spp. --------- 3
	Paper birch ------- 3	Red maple --------- 2			Wintergreen -------- 2
	Sugar maple ------- 3	Sugar maple ------- 2			Trillium spp. ------ 2
	Northern red oak -- 3	E. white pine ----- 2			Canada blueberry --- 1
	White oak --------- 3	American beech ---- 1			Gay wings ---------- 1
	American basswood - 2	Bigtooth aspen ---- 1			Hepatica spp. ------ 1
	White ash --------- 2	Northern red oak -- 1			Rosy twisted stalk - 1
	Bigtooth aspen ---- 2	White oak --------- 1			Violet spp. -------- 1
	Hophornbeam ------- 2				
	Red pine ---------- 2				
	Quaking aspen ----- 1				
	Black cherry ------ 1				
114A------------------	Quaking aspen ----- 4	Red maple --------- 2	Redosier dogwood -- 2	Bracken fern ------ 5	Sedge spp. --------- 3
Ingalls	American basswood - 2	Northern red oak -- 2	Serviceberry ------ 1		Low bush blueberry - 3
	Bigtooth aspen ---- 2	E. white pine ----- 1		Ground pine ------- 2	Dewberry ----------- 3
	Paper birch ------- 2			Ground cedar ------ 2	Grass spp. --------- 3
	Red maple --------- 2				Starflower --------- 3
	Northern red oak -- 2				Wintergreen -------- 3
	Balsam poplar ----- 1				Canada blueberry --- 2
	E. white pine ----- 1				Goldthread --------- 2
	Red pine ---------- 1				Violet spp. -------- 1
120B, 120C-------------	Bigtooth aspen ---- 4	White ash --------- 3	Witch hazel ------- 3	Bracken fern ------ 4	Grass spp. --------- 3
Morganlake	Paper birch ------- 3	Quaking aspen ----- 3	Serviceberry ------ 2	Cinnamon fern ----- 1	Gay wings ---------- 2
	Red maple --------- 3	Black cherry ------ 3	Hawthorn spp. ----- 1		Partridgeberry ----- 2
	Sugar maple ------- 3	Red maple --------- 3			Solomon's seal ----- 2
	Northern red oak -- 3	Northern red oak -- 3			Starflower --------- 2
	White oak --------- 3	White oak --------- 3			Wintergreen -------- 2
	American beech ---- 2	American beech ---- 2			Bedstraw/cleavers -- 1
	White ash --------- 2	Sugar maple ------- 2			Low bush blueberry - 1
	Black cherry ------ 1	E. white pine ----- 2			Twinflower --------- 1
	Hophornbeam ------- 1				
	E. white pine ----- 1				
	Red pine ---------- 1				

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
123D------------------	Quaking aspen ----- 4	Red maple --------- 3	Serviceberry ------ 3	Bracken fern ------ 4	Grass spp. --------- 5
Klacking	Northern red oak -- 4	Northern red oak -- 3	Witch hazel ------- 2		Wild sarsaparilla -- 3
	Bigtooth aspen ---- 3	E. white pine ----- 1			Wintergreen -------- 3
	Black cherry ------ 3	American beech ---- 1			Wild strawberry ---- 3
	Red maple --------- 3	Quaking aspen ----- 1			Canada blueberry --- 3
	White oak --------- 3	Black cherry ------ 1			Sedge spp. --------- 3
	Red pine ---------- 3				Starflower --------- 2
	Jack pine --------- 2				Large leaf aster --- 2
	American beech ---- 1				Low bush blueberry - 2
	E. white pine ----- 1				Bramble spp. ------- 2
					Sweetfern ---------- 2
					Starflower --------- 2
					Blue cladonia ------ 1
					Reindeer lichen ---- 1
144B, 144C------------	Bigtooth aspen ---- 4	Red maple --------- 4	Serviceberry ------ 3	Bracken fern ------ 3	Grass spp. --------- 4
Perecheney	Black cherry ------ 3	Black cherry ------ 3	Witch hazel ------- 3		Sweetfern ---------- 3
	Quaking aspen ----- 3	Northern red oak -- 2	Beaked hazelnut --- 2		Wintergreen -------- 3
	Red maple --------- 3	Bigtooth aspen ---- 1	Hawthorn spp. ----- 2		Sedge spp. --------- 3
	Northern red oak -- 3	White oak --------- 1	Maple leaf viburnum --------- 1		Aster spp. --------- 2
	Jack pine --------- 3	E. white pine ----- 1			Large leaf aster --- 2
	Paper birch ------- 2				Low bush blueberry - 2
	Red pine ---------- 2				Canada blueberry --- 2
	Choke cherry ------ 1				Canada mayflower --- 2
	White oak --------- 1				Bedstraw/cleavers -- 1
	E. white pine ----- 1				Wild strawberry ---- 1
					Bramble spp. ------- 1
					Dewberry ----------- 1
					False Solomon's seal 1
					Violet spp. -------- 1
159A------------------	Quaking aspen ----- 4	Quaking aspen ----- 2	Sand cherry ------- 1	Bracken fern ------ 4	Low bush blueberry - 4
Finch	Red maple --------- 3	Paper birch ------- 2			Blue cladonia ------ 4
	Jack pine --------- 3	Black cherry ------ 2			Reindeer lichen ---- 4
	American basswood - 3	Red maple --------- 2			Sheep laurel ------- 3
	White ash --------- 2	Balsam fir -------- 2			Sedge spp. --------- 3
	Balsam fir -------- 2	E. white pine ----- 2			
	Eastern hemlock --- 2				
	E. white pine ----- 2				
	White spruce ------ 2				
	Black cherry ------ 1				
	Red pine ---------- 1				

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
307B, 307E------------	Quaking aspen ----- 4	Red maple --------- 3	Serviceberry ------ 3	Bracken fern ------ 4	Grass spp. --------- 5
Klacking	Northern red oak -- 4	Northern red oak -- 3	Witch hazel ------- 2		Wild sarsaparilla -- 3
	Bigtooth aspen ---- 3	E. white pine ----- 1			Wintergreen -------- 3
	Black cherry ------ 3	American beech ---- 1			Wild strawberry ---- 3
	Red maple --------- 3	Quaking aspen ----- 1			Canada blueberry --- 3
	White oak --------- 3	Black cherry ------ 1			Sedge spp. --------- 3
	Red pine ---------- 3				Starflower --------- 2
	Jack pine --------- 2				Large leaf aster --- 2
	American beech ---- 1				Low bush blueberry - 2
	E. white pine ----- 1				Bramble spp. ------- 2
					Sweetfern ---------- 2
					Starflower --------- 2
					Blue cladonia ------ 1
					Reindeer lichen ---- 1
360-------------------	Green ash --------- 3	Green ash --------- 3	Speckled alder ---- 4	Sensitive fern ---- 3	Grass spp. --------- 5
Wakeley	Red maple --------- 3	Black ash --------- 2	Redosier dogwood -- 1	Bracken fern ------ 2	Sedge spp. --------- 3
	American basswood - 2	American basswood - 1		Oak fern ---------- 2	Bedstraw/cleavers -- 2
	Black ash --------- 2	Swamp white oak --- 1		Shield fern ------- 2	Bugleweed ---------- 2
	Eastern hemlock --- 2	American elm ------ 1		Cinnamon fern ----- 1	Dewberry ----------- 2
	N. white cedar ---- 2				Horsetail spp. ----- 2
	Balsam fir -------- 1				Jewelweed ---------- 2
	Silver maple ------ 1				Violet spp. -------- 2
	American elm ------ 1				Baneberry spp. ----- 1
					Bramble spp. ------- 1
					Jack-in-the-pulpit - 1
					Nettle spp. -------- 1
					Canada mayflower --- 1
					Wild sarsaparilla -- 1
					Wild strawberry ---- 1
					Wild grape spp. ---- 1
					Poison ivy --------- 1
					Bulrush spp. ------- 1
					Swamp milkweed ----- 1
					Water hemlock ------ 1
					Cardinal flower ---- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
368A:					
Au Gres---------------	Quaking aspen ----- 3	Red maple --------- 3	Leatherleaf ------- 3	Bracken fern ------ 4	Dewberry ----------- 4
	Red maple --------- 3	Black cherry ------ 2	Speckled alder ---- 2		Grass spp. --------- 4
	Jack pine --------- 3	Black oak --------- 2	Serviceberry ------ 2		Wood anemone ------- 3
	Black spruce ------ 3	E. white pine ----- 2	Northern bush		Canada blueberry --- 3
	Paper birch ------- 2	Quaking aspen ----- 1	honeysuckle ------ 1		Low bush blueberry - 3
	Black cherry ------ 2	Balsam fir -------- 1	Honeysuckle spp. -- 1		Gay wings ---------- 3
	Red pine ---------- 2				Sedge spp. --------- 3
	Black oak --------- 2				Wintergreen -------- 3
	E. white pine ----- 2				Canada mayflower --- 2
	White spruce ------ 1				Large leaf aster --- 2
	Tamarack ---------- 1				Bramble spp. ------- 2
					Sweetfern ---------- 1
					Starflower --------- 1
Deford----------------	Black ash --------- 4	Black ash --------- 2	Meadow-sweet ------ 5	Sensitive fern ---- 4	Sedge spp. --------- 6
	Red maple --------- 3	Bigtooth aspen ---- 2	Redosier dogwood -- 4	Cinnamon fern ----- 4	Grass spp. --------- 6
	Bigtooth aspen ---- 3	Northern red oak -- 2	Speckled alder ---- 4	Bracken fern ------ 3	Bunchberry --------- 4
	Paper birch ------- 3	Choke cherry ------ 1	Willow spp. ------- 4	Royal fern -------- 2	Gay wings ---------- 4
	Black cherry ------ 2	Red maple --------- 1	Swamp birch ------- 2	Lady fern --------- 1	Sphagnum moss ------ 4
	Northern red oak -- 2	Balsam fir -------- 1		Shield fern ------- 1	Starflower --------- 4
	Balsam fir -------- 2	E. white pine ----- 1			Violet spp. -------- 4
	E. white pine ----- 2				Low bush blueberry - 3
	Quaking aspen ----- 1				Bramble spp. ------- 3
	Balsam poplar ----- 1				Goldthread --------- 3
	Choke cherry ------ 1				Horsetail spp. ----- 3
	Jack pine --------- 1				Jewelweed ---------- 3
					Joe-Pye-weed ------- 3
					Mint spp. ---------- 3
					Wild strawberry ---- 3
					Bedstraw/cleavers -- 2
					Blueflag ----------- 2
					Cinquefoil spp. ---- 2
					Columbine ---------- 2
					Wild sarsaparilla -- 2
					Cardinal flower ---- 2
					False Solomon's seal 1
					Jack-in-the-pulpit - 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
369--------------------	Black ash --------- 4	Black ash --------- 2	Meadow-sweet ------ 5	Sensitive fern ---- 4	Sedge spp. --------- 6
Deford	Red maple --------- 3	Bigtooth aspen ---- 2	Redosier dogwood -- 4	Cinnamon fern ----- 4	Grass spp. --------- 6
	Bigtooth aspen ---- 3	Northern red oak -- 2	Speckled alder ---- 4	Bracken fern ------ 3	Bunchberry --------- 4
	Paper birch ------- 3	Choke cherry ------ 1	Willow spp. ------- 4	Royal fern -------- 2	Gay wings ---------- 4
	Black cherry ------ 2	Red maple --------- 1	Swamp birch ------- 2	Lady fern --------- 1	Sphagnum moss ------ 4
	Northern red oak -- 2	Balsam fir -------- 1		Shield fern ------- 1	Starflower --------- 4
	Balsam fir -------- 2	E. white pine ----- 1			Violet spp. -------- 4
	E. white pine ----- 2				Low bush blueberry - 3
	Quaking aspen ----- 1				Bramble spp. ------- 3
	Balsam poplar ----- 1				Goldthread --------- 3
	Choke cherry ------ 1				Horsetail spp. ----- 3
	Jack pine --------- 1				Jewelweed ---------- 3
					Joe-Pye-weed ------- 3
					Mint spp. ---------- 3
					Wild strawberry ---- 3
					Bedstraw/cleavers -- 2
					Blueflag ----------- 2
					Cinquefoil spp. ---- 2
					Columbine ---------- 2
					Wild sarsaparilla -- 2
					Cardinal flower ---- 2
					False Solomon's seal 1
					Jack-in-the-pulpit - 1
380.					
Access denied					
382B-------------------	Quaking aspen ----- 4	Quaking aspen ----- 2	---	Bracken fern ------ 5	Canada blueberry --- 4
Proper	Red maple --------- 3				Low bush blueberry - 4
	Northern red oak -- 3				Sedge spp. --------- 4
	Black cherry ------ 2				Wintergreen -------- 3
	E. white pine ----- 2				Bramble spp. ------- 2
	Red pine ---------- 2				Grass spp. --------- 2
	Jack pine --------- 1				
408.					
Sims					
410B:					
Proper----------------	Quaking aspen ----- 4	Quaking aspen ----- 2	---	Bracken fern ------ 5	Canada blueberry --- 4
	Red maple --------- 3				Low bush blueberry - 4
	Northern red oak -- 3				Sedge spp. --------- 4
	Black cherry ------ 2				Wintergreen -------- 3
	E. white pine ----- 2				Bramble spp. ------- 2
	Red pine ---------- 2				Grass spp. --------- 2
	Jack pine --------- 1				

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
410B:					
Finch	Quaking aspen ----- 4	Quaking aspen ----- 2	Sand cherry ------- 1	Bracken fern ------ 4	Low bush blueberry - 4
	Red maple --------- 3	Paper birch ------- 2			Blue cladonia ------ 4
	Jack pine --------- 3	Black cherry ------ 2			Reindeer lichen ---- 4
	American basswood - 3	Red maple --------- 2			Sheep laurel ------- 3
	White ash --------- 2	Balsam fir -------- 2			Sedge spp. --------- 3
	Balsam fir -------- 2	E. white pine ----- 2			
	Eastern hemlock --- 2				
	E. white pine ----- 2				
	White spruce ------ 2				
	Black cherry ------ 1				
	Red pine ---------- 1				
Deford	Black ash --------- 4	Black ash --------- 2	Meadow-sweet ------ 5	Sensitive fern ---- 4	Sedge spp. --------- 6
	Red maple --------- 3	Bigtooth aspen ---- 2	Redosier dogwood -- 4	Cinnamon fern ----- 4	Grass spp. --------- 6
	Bigtooth aspen ---- 3	Northern red oak -- 2	Speckled alder ---- 4	Bracken fern ------ 3	Bunchberry --------- 4
	Paper birch ------- 3	Choke cherry ------ 1	Willow spp. ------- 4	Royal fern -------- 2	Gay wings ---------- 4
	Black cherry ------ 2	Red maple --------- 1	Swamp birch ------- 2	Lady fern --------- 1	Sphagnum moss ------ 4
	Northern red oak -- 2	Balsam fir -------- 1		Shield fern ------- 1	Starflower --------- 4
	Balsam fir -------- 2	E. white pine ----- 1			Violet spp. -------- 4
	E. white pine ----- 2				Low bush blueberry - 3
	Quaking aspen ----- 1				Bramble spp. ------- 3
	Balsam poplar ----- 1				Goldthread --------- 3
	Choke cherry ------ 1				Horsetail spp. ----- 3
	Jack pine --------- 1				Jewelweed ---------- 3
					Joe-Pye-weed ------- 3
					Mint spp. ---------- 3
					Wild strawberry ---- 3
					Bedstraw/cleavers -- 2
					Blueflag ----------- 2
					Cinquefoil spp. ---- 2
					Columbine ---------- 2
					Wild sarsaparilla -- 2
					Cardinal flower ---- 2
					False Solomon's seal 1
					Jack-in-the-pulpit - 1
429D.					
Menominee					

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
441B, 441C------------- Morganlake-Nester	Sugar maple ------- 4	White ash --------- 3	Witch hazel ------- 3	Bracken fern ------ 4	Grass spp. --------- 4
	American beech ---- 3	Quaking aspen ----- 3	Serviceberry ------ 2		Low bush blueberry - 2
	Bigtooth aspen ---- 3	Black cherry ------ 3	Hawthorn spp. ----- 1		Gay wings ---------- 2
	Northern red oak -- 3	Red maple --------- 3			Partridgeberry ----- 2
	White oak --------- 3	American beech ---- 2			Solomon's seal ----- 2
	American basswood - 2	Hophornbeam ------- 2			Starflower --------- 2
	White ash --------- 2	Sugar maple ------- 2			Trillium spp. ------ 2
	Quaking aspen ----- 2	Northern red oak -- 2			Wintergreen -------- 2
	Paper birch ------- 2	White oak --------- 2			Bedstraw/cleavers -- 1
	Red pine ---------- 2	E. white pine ----- 2			Canada blueberry --- 1
	Hophornbeam ------- 1	Bigtooth aspen ---- 1			Hepatica spp. ------ 1
	Black cherry ------ 1				Rosy twisted stalk - 1
	E. white pine ----- 1				Twinflower --------- 1
					Violet spp. -------- 1
					Wood anemone ------- 1
442D------------------ Menominee-Curtisville	Sugar maple ------- 4	White ash --------- 3	Witch hazel ------- 3	Bracken fern ------ 4	Grass spp. --------- 4
	American beech ---- 3	Quaking aspen ----- 3	Serviceberry ------ 2		Low bush blueberry - 2
	Bigtooth aspen ---- 3	Black cherry ------ 3	Hawthorn spp. ----- 1		Gay wings ---------- 2
	Northern red oak -- 3	Red maple --------- 3			Partridgeberry ----- 2
	White oak --------- 3	American beech ---- 2			Solomon's seal ----- 2
	American basswood - 2	Hophornbeam ------- 2			Starflower --------- 2
	White ash --------- 2	Sugar maple ------- 2			Trillium spp. ------ 2
	Quaking aspen ----- 2	Northern red oak -- 2			Wintergreen -------- 2
	Paper birch ------- 2	White oak --------- 2			Bedstraw/cleavers -- 1
	Red pine ---------- 2	E. white pine ----- 2			Canada blueberry --- 1
	Hophornbeam ------- 1	Bigtooth aspen ---- 1			Hepatica spp. ------ 1
	Black cherry ------ 1				Rosy twisted stalk - 1
	E. white pine ----- 1				Twinflower --------- 1
					Violet spp. -------- 1
					Wood anemone ------- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
473-------------------	Quaking aspen ----- 3	Red maple --------- 3	Leatherleaf ------- 1	Bracken fern ------ 3	Bunchberry --------- 3
Deford-Kinross	Red maple --------- 3	E. white pine ----- 3		Cinnamon fern ----- 2	Yellow beadlily ---- 3
	Balsam fir -------- 3	Paper birch ------- 2			Low bush blueberry - 3
	Black spruce ------ 3	Black oak --------- 2		Shining clubmoss -- 3	Labrador tea ------- 3
	E. white pine ----- 3	Black spruce ------ 2		Running pine ------ 2	Sphagnum moss ------ 3
	N. white cedar ---- 2	Black ash --------- 1			Sedge spp. --------- 3
	Black ash --------- 2	White oak --------- 1			Canada mayflower --- 3
	Paper birch ------- 2	Balsam fir -------- 1			Wintergreen -------- 3
	Northern red oak -- 2				Grass spp. --------- 2
	Jack pine --------- 2				Starflower --------- 2
	White spruce ------ 2				Goldthread --------- 2
	Bigtooth aspen ---- 1				Nettle spp. -------- 2
	Black cherry ------ 1				Partridgeberry ----- 2
	Red pine ---------- 1				Huckleberry -------- 1
	Tamarack ---------- 1				Canada blueberry --- 1
					Cow wheat ---------- 1
					Creeping wintergreen 1
					Dewberry ----------- 1
					Indian cucumber-root 1
					Trailing arbutus --- 1
474.					
Histosols-Fluvaquents					
475B, 475D, 475E-------	Quaking aspen ----- 5	Red maple --------- 4	Witch hazel ------- 4	Bracken fern ------ 4	Sedge spp. --------- 4
Graycalm-Klacking	Red maple --------- 3	Black oak --------- 3	Serviceberry ------ 2		Low bush blueberry - 4
	Northern red oak -- 3	Bigtooth aspen ---- 2	Hawthorn spp. ----- 1	Staghorn clubmoss - 1	Wintergreen -------- 4
	Bigtooth aspen ---- 3	Black cherry ------ 2	Northern bush		Grass spp. --------- 4
	Black cherry ------ 2	Northern red oak -- 2	honeysuckle ------ 1		Blue cladonia ------ 3
	Black oak --------- 2	White oak --------- 2			Bramble spp. ------- 3
	White oak --------- 2	E. white pine ----- 2			Gay wings ---------- 3
	E. white pine ----- 2	Choke cherry ------ 1			Reindeer lichen ---- 3
	Jack pine --------- 1	Quaking aspen ----- 1			Canada blueberry --- 2
					Rosy twisted stalk - 2
					Starflower --------- 2
					Sweetfern ---------- 2
					Wild strawberry ---- 2
					Bedstraw/cleavers -- 1
					Cow wheat ---------- 1
					Pyrola spp. -------- 1
					Violet spp. -------- 1
					Wood anemone ------- 1
					White lettuce ------ 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
476B, 476D------------ Klacking-Perecheney	Quaking aspen ----- 4	Quaking aspen ----- 3	Witch hazel ------- 2	Bracken fern ------ 4	Low bush blueberry - 4
	Bigtooth aspen ---- 3	Black cherry ------ 3	Serviceberry ------ 2		Grass spp. --------- 4
	Red maple --------- 3	Choke cherry ------ 2	Hawthorn spp. ----- 2	Staghorn clubmoss - 1	Wintergreen -------- 4
	Northern red oak -- 3	Red maple --------- 2		Ground pine ------- 1	Starflower --------- 3
	White oak --------- 2	Black oak --------- 2			Sweetfern ---------- 3
	E. white pine ----- 2	White oak --------- 2			Violet spp. -------- 3
	Jack pine --------- 2	E. white pine ----- 2			Canada mayflower --- 3
	Red pine ---------- 2	White ash --------- 1			Wild strawberry ---- 3
	Paper birch ------- 1	Balsam fir -------- 1			Sedge spp. --------- 3
	Black cherry ------ 1				Bramble spp. ------- 2
	Balsam fir -------- 1				Gay wings ---------- 2
	White spruce ------ 1				Bearberry ---------- 1
					Bedstraw/cleavers -- 1
					Cow wheat ---------- 1
					Pyrola spp. -------- 1
490. Urban land-Aquents					
491A------------------ Geels	Black oak --------- 4	Red maple --------- 3	Hawthorn spp. ----- 2	Bracken fern ------ 4	Sedge spp. --------- 4
	Quaking aspen ----- 3	Black oak --------- 3	Beaked hazelnut --- 1		Large leaf aster --- 3
	Paper birch ------- 2	White oak --------- 3	Sand cherry ------- 1	Ground cedar ------ 1	Canada blueberry --- 3
	Black cherry ------ 2	Black cherry ------ 2	Northern bush honeysuckle ------ 1		Low bush blueberry - 3
	Red maple --------- 2	Northern red oak -- 2			Grass spp. --------- 3
	Northern red oak -- 2	E. white pine ----- 2	Serviceberry ------ 1		Wild sarsaparilla -- 3
	E. white pine ----- 2	Quaking aspen ----- 1	Witch hazel ------- 1		Starflower --------- 3
	Jack pine --------- 2	Jack pine --------- 1			Canada mayflower --- 3
	Red pine ---------- 2	Red pine ---------- 1			Sweetfern ---------- 2
	White oak --------- 1	White spruce ------ 1			Bearberry ---------- 2
	Balsam fir -------- 1				Bramble spp. ------- 2
					Cinquefoil spp. ---- 2
					Cow wheat ---------- 2
					Dewberry ----------- 2
					Wintergreen -------- 2
					Bedstraw/cleavers -- 1
					Bunchberry --------- 1
					Gay wings ---------- 1
					Hawkweed spp. ------ 1
					Rosy twisted stalk - 1
					Wild bergamot ------ 1
					Wild strawberry ---- 1
					Wood anemone ------- 1
					Huckleberry -------- 1
					Harebell ----------- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
492A------------------	Quaking aspen ----- 4	Balsam fir -------- 3	Maple leaf	Bracken fern ------ 4	Grass spp. --------- 3
Allendale, sandy	Eastern hemlock --- 4	Red maple --------- 3	viburnum --------- 3		Wild sarsaparilla -- 3
substratum	E. white pine ----- 3	American beech ---- 2	Serviceberry ------ 1	Ground pine ------- 3	Bunchberry --------- 3
	Sugar maple ------- 3	Black oak --------- 2		Shining clubmoss -- 2	Gay wings --------- 3
	Balsam fir -------- 3	Black cherry ------ 1		Staghorn clubmoss - 1	Dewberry ----------- 2
	American beech ---- 3	Sugar maple ------- 1			Partridgeberry ----- 2
	Red maple --------- 2	Eastern hemlock --- 1			Starflower --------- 2
	Paper birch ------- 1	E. white pine ----- 1			Violet spp. -------- 2
	Red pine ---------- 1				Canada mayflower --- 2
					Large leaf aster --- 2
					Bedstraw/cleavers -- 2
					Canada blueberry --- 2
					Baneberry spp. ----- 1
					Yellow beadlily ---- 1
					White lettuce ------ 1
					False Solomon's seal 1
					Goldthread --------- 1
					Indian cucumber-root 1
					Twinflower --------- 1
					Wintergreen -------- 1
493A------------------	Quaking aspen ----- 6	Red maple --------- 4	Redosier dogwood -- 3	Bracken fern ------ 5	Sedge spp. --------- 5
Otisco	Bigtooth aspen ---- 4	Bigtooth aspen ---- 2	Serviceberry ------ 2		Low bush blueberry - 3
	Red maple --------- 3	Balsam fir -------- 2	Beaked hazelnut --- 2	Ground pine ------- 2	Dewberry ----------- 3
	Eastern hemlock --- 3	E. white pine ----- 2	Witch hazel ------- 1	Ground cedar ------ 2	Grass spp. --------- 3
	Paper birch ------- 2	Black cherry ------ 1			Indian cucumber-root 3
	Black cherry ------ 2	Black oak --------- 1			Starflower --------- 3
	Northern red oak -- 2	Eastern hemlock --- 1			Canada mayflower --- 3
	White oak --------- 2				Wintergreen -------- 3
	Jack pine --------- 2				Canada blueberry --- 2
	Red pine ---------- 2				Goldthread --------- 2
	American beech ---- 1				Trout lily --------- 2
	E. white pine ----- 1				Violet spp. -------- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
495B, 495D, 495F------- Gerrish	Bigtooth aspen ---- 4 Black oak --------- 4 Northern red oak -- 4 Quaking aspen ----- 3 Red maple --------- 3 White oak --------- 3 Jack pine --------- 3 Black cherry ------ 2 E. white pine ----- 2 Red pine ---------- 1	Black oak --------- 3 Northern red oak -- 3 Black cherry ------ 3 Jack pine --------- 2 Bigtooth aspen ---- 2 Quaking aspen ----- 2 Red maple --------- 2 White oak --------- 2 E. white pine ----- 1 Red pine ---------- 1	Serviceberry ------ 2	Bracken fern ------ 4	Sedge spp. --------- 5 Grass spp. --------- 4 Low bush blueberry - 3 Bramble spp. ------- 3 Sweetfern ---------- 3 Cow wheat ---------- 2 Bellwort spp. ------ 1 Reindeer lichen ---- 1
496B, 496D, 496F. Gerrish-Grayling					
497A. Debolt					
498A------------------ Pinewood	Bigtooth aspen ---- 5 Quaking aspen ----- 4 Balsam fir -------- 4 Black oak --------- 2 Red pine ---------- 2 Red maple --------- 1	Black cherry ------ 3 Red maple --------- 2 Black oak --------- 2 Balsam fir -------- 2 Bigtooth aspen ---- 1 Quaking aspen ----- 1	Hawthorn spp. ----- 3 Serviceberry ------ 2 Beaked hazelnut --- 1 Maple leaf viburnum --------- 1	Bracken fern ------ 5 Ground pine ------- 1	Large leaf aster --- 4 Grass spp. --------- 4 Black snakeroot ---- 3 Low bush blueberry - 3 Bunchberry --------- 3 Hepatica ----------- 3 Wild strawberry ---- 3 Wood betony -------- 3 Dewberry ----------- 2 Gay wings ---------- 2 Sedge spp. --------- 2 Violet spp. -------- 2 Canada mayflower --- 2 Bedstraw/cleavers -- 1 Canada blueberry --- 1 Bramble spp. ------- 1 False Solomon's seal 1 Partridgeberry ----- 1 Pyrola spp. -------- 1 Starflower --------- 1 Sweet cicely ------- 1 Wild sarsaparilla -- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
499--------------------	Tamarack ---------- 3	Tamarack ---------- 3	Leatherleaf ------- 6	---	Sphagnum moss ------ 7
Dawson-Kinross	Paper birch ------- 2	Black spruce ------ 2	Redosier dogwood -- 3		Pale laurel -------- 3
	Jack pine --------- 2	Jack pine --------- 2	Speckled alder ---- 3		Labrador tea ------- 3
	Red pine ---------- 1	E. white pine ----- 1			Canada blueberry --- 2
	E. white pine ----- 1	Red pine ---------- 1			Low bush blueberry - 2
	Black spruce ------ 1				Bog rosemary ------- 2
					Goldthread --------- 2
					Grass spp. --------- 2
					Sedge spp. --------- 2
					Bunchberry --------- 1
					Cranberry spp. ----- 1
500A-------------------	Quaking aspen ----- 4	Black cherry ------ 3	Serviceberry ------ 2	Bracken fern ------ 6	Low bush blueberry - 4
Flink	Red maple --------- 3	Red maple --------- 3	Northern bush		Wintergreen -------- 4
	Jack pine --------- 3	Black oak --------- 2	honeysuckle ------ 1	Shining clubmoss -- 2	Canada blueberry --- 3
	Black cherry ------ 2	Quaking aspen ----- 1		Ground pine ------- 2	Bramble spp. ------- 3
	Black oak --------- 2	Balsam fir -------- 1			Bunchberry --------- 3
	Bigtooth aspen ---- 1	N. white cedar ---- 1			Dewberry ----------- 3
	E. white pine ----- 1	E. white pine ----- 1			Bunchberry --------- 3
					Grass spp. --------- 3
					Canada mayflower --- 3
					Starflower --------- 2
					Sweetfern ---------- 2
					Large leaf aster --- 1
					Yellow beadlily ---- 1
					Cow wheat ---------- 1
					Gay wings ---------- 1
					Pyrola spp. -------- 1
					Trailing arbutus --- 1
					Wild sarsaparilla -- 1
					White lettuce ------ 1
					Prince pine -------- 1

See footnote at end of table.

Table 9.--Plant Communities on Selected Soils--Continued

Map symbol and soil name	Extent of major and minor trees*	Extent of seedlings*	Extent of shrubs*	Extent of ferns and clubmoss*	Extent of ground plants*
501B-------------------	Quaking aspen ----- 5	Choke cherry ------ 3	Beaked hazelnut --- 2	Bracken fern ------ 5	Grass spp. --------- 5
Kellogg, sandy	Red maple --------- 3	Black cherry ------ 2	Hawthorn spp. ----- 2		Wood betony -------- 4
substratum	Northern red oak -- 3	Red maple --------- 2	Maple leaf	Shining clubmoss -- 1	Large leaf aster --- 3
	Black cherry ------ 2	Black oak --------- 2	viburnum --------- 2	Ground pine ------- 1	Low bush blueberry - 3
	Choke cherry ------ 2	Quaking aspen ----- 1	Willow spp. ------- 2		Bunchberry --------- 3
	Jack pine --------- 2	White oak --------- 1	Gray dogwood ------ 2		Dewberry ----------- 3
	Red pine ---------- 2	E. white pine ----- 1	Serviceberry ------ 1		Hawkweed spp. ------ 3
	Paper birch ------- 1	Red pine ---------- 1	Witch hazel ------- 1		Sweetfern ---------- 3
	Black oak --------- 1		Honeysuckle spp. -- 1		Wild bergamot ------ 3
	Balsam fir -------- 1				Bedstraw/cleavers -- 2
	E. white pine ----- 1				Canada blueberry --- 2
					Starflower --------- 2
					Canada mayflower --- 2
					Wild strawberry ---- 2
					Wood anemone ------- 2
					White lettuce ------ 2
					Black snakeroot ---- 1
					Bramble spp. ------- 1
					Cow wheat ---------- 1
					Horsetail spp. ----- 1
					Reindeer lichen ---- 1
					Violet spp. -------- 1
					Wild sarsaparilla -- 1
					Wintergreen -------- 1
					Wild rose ---------- 1
					Wild geranium ------ 1
					Harebell ----------- 1
502B.					
Kawkawlin-Sims					

* The extent of the plants listed is expressed as a number representing the amount of ground covered by the plants. The number 1 means that the plant covers less than 1 percent of the surface, 2 means 1 to 5 percent, 3 means 5 to 25 percent, 4 means 25 to 50 percent, 5 means 50 to 75 percent, 6 means 75 to 95 percent, and 7 means 95 to 100 percent.

Table 10.--Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height on the soil)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
13:					
Tawas	Common ninebark, redosier dogwood, silky dogwood	Nannyberry, southern arrowwood, black spruce	Northern white cedar, green ash	---	---
Lupton.					
14:					
Dawson.					
Loxley	Common ninebark, gray dogwood, silky dogwood	American cranberrybush, common lilac, nannyberry	Northern white cedar	Siberian crabapple, Norway spruce, eastern white pine, green ash	Imperial Carolina poplar
15A:					
Croswell	Siberian peashrub, manyflower cotoneaster	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---
Au Gres	Common ninebark	American cranberrybush, Amur maple, nannyberry	White spruce	Manchurian crabapple, Norway spruce, jack pine, eastern white pine, green ash	Imperial Carolina poplar
16B:					
Graycalm	Siberian peashrub	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---
17A:					
Croswell	Siberian peashrub, manyflower cotoneaster	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---
18A:					
Au Gres	Common ninebark	American cranberrybush, Amur maple, nannyberry	White spruce	Manchurian crabapple, Norway spruce, jack pine, eastern white pine, green ash	Imperial Carolina poplar
20B:					
Graycalm	Siberian peashrub	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
20B:					
Grayling----------	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
20D:					
Graycalm----------	Siberian peashrub	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---
Grayling----------	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
20F:					
Graycalm----------	Siberian peashrub, barberry	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---
Grayling----------	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
23. Ausable-Bowstring					
24A: Kinross.					
Au Gres-----------	Common ninebark---	American cranberrybush, Amur maple, nannyberry	White spruce------	Manchurian crabapple, Norway spruce, jack pine, eastern white pine, green ash	Imperial Carolina poplar
26B:					
Cublake-----------	Peking cotoneaster, Siberian peashrub, buffaloberry, common lilac, smooth sumac, staghorn sumac	Eastern redcedar	Austrian pine, jack pine, red pine, eastern white pine	Manchurian crabapple	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
34B:					
Kneff	Common ninebark	American cranberrybush, common lilac	Amur maple, nannyberry, northern white cedar, white spruce	Siberian crabapple, green ash, Norway spruce, eastern white pine, red pine	---
35. Kinross					
47D:					
Graycalm	Siberian peashrub	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---
47F:					
Graycalm	Siberian peashrub	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---
50B:					
Au Gres	Common ninebark	American cranberrybush, Amur maple, nannyberry	White spruce	Manchurian crabapple, Norway spruce, jack pine, eastern white pine, green ash	Imperial Carolina poplar
Kinross.					
Croswell	Siberian peashrub, manyflower cotoneaster	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---
51:					
Tawas	Common ninebark, redosier dogwood, silky dogwood	Nannyberry, southern arrowwood, black spruce	Northern white cedar, green ash	---	---
Leafriver.					
57B:					
Kawkawlin	Roselow sargent crabapple, common ninebark, silky dogwood	American cranberrybush, common lilac, Amur maple, nannyberry, northern white cedar	White spruce, Norway spruce, eastern white pine, red pine	---	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
58A:					
Wakeley.					
Allendale	Roselow sargent crabapple	American cranberrybush, common lilac, nannyberry, northern white cedar	Blue spruce, white spruce	Manchurian crabapple, Norway spruce, eastern white pine, red maple	---
67A:					
Bowers	Common ninebark, silky dogwood	American cranberrybush, common lilac, nannyberry, northern white cedar	White spruce	Manchurian crabapple, Norway spruce, red pine, eastern white pine, green ash	---
Deerheart.					
75B:					
Rubicon	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
75D:					
Rubicon	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
78.					
Pits					
81B:					
Grayling	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
81D:					
Grayling	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
81F:					
Grayling	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
82B. Udorthents					
83B, 83F. Udipsamments					
86. Histosols and Aquents					
87. Ausable					
90B. Chinwhisker					
102D:					
Curtisville	Siberian peashrub, common ninebark	Common lilac, nannyberry, southern arrowwood	Blue spruce, white spruce	Manchurian crabapple, green ash, red pine, eastern white pine	---
103B:					
Nester	Siberian peashrub, common ninebark	Common lilac, nannyberry, southern arrowwood	Blue spruce, white spruce	Manchurian crabapple, green ash, red pine, eastern white pine	---
103C:					
Nester	Siberian peashrub, common ninebark	Common lilac, nannyberry, southern arrowwood	Blue spruce, white spruce	Manchurian crabapple, green ash, red pine, eastern white pine	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
114A:					
Ingalls	American cranberrybush, Roselow sargent crabapple, Siberian peashrub, common ninebark	Common lilac, northern white cedar	Manchurian crabapple, white spruce, Norway spruce	Eastern white pine, green ash	---
120B:					
Morganlake	American cranberrybush	Common lilac, eastern redcedar, nannyberry, northern white cedar	Manchurian crabapple, Black Hills spruce, white spruce, Norway spruce	Eastern white pine, green ash	Imperial Carolina poplar
120C:					
Morganlake	American cranberrybush	Common lilac, eastern redcedar, nannyberry, northern white cedar	Manchurian crabapple, Black Hills spruce, white spruce, Norway spruce	Eastern white pine, green ash	Imperial Carolina poplar
123D:					
Klacking	Roselow sargent crabapple, common ninebark	Common lilac, Amur maple, nannyberry	Siberian crabapple, eastern redcedar, white spruce	Norway spruce, eastern white pine, red pine	Imperial Carolina poplar
144B:					
Perecheney	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
144C:					
Perecheney	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
159A:					
Finch	Common ninebark, silky dogwood	American cranberrybush, Amur maple, nannyberry, northern white cedar	---	Norway spruce, Siberian crabapple, jack pine, white spruce, eastern white pine, green ash	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
307B:					
Klacking	Roselow sargent crabapple, common ninebark	Common lilac, Amur maple, nannyberry	Siberian crabapple, eastern redcedar, white spruce	Norway spruce, eastern white pine, red pine	Imperial Carolina poplar
307E:					
Klacking	Roselow sargent crabapple, common ninebark	Common lilac, Amur maple, nannyberry	Siberian crabapple, eastern redcedar, white spruce	Norway spruce, eastern white pine, red pine	Imperial Carolina poplar
360.					
Wakeley					
368A:					
Au Gres	Common ninebark	American cranberrybush, Amur maple, nannyberry	White spruce	Manchurian crabapple, Norway spruce, jack pine, eastern white pine, green ash	Imperial Carolina poplar
Deford.					
369.					
Deford					
380.					
Access denied					
382B.					
Proper					
408.					
Sims					
410B.					
Proper-Finch-Deford					
429D:					
Menominee	Common lilac, sargent crabapple	Amur maple, eastern redcedar, nannyberry	Siberian crabapple, white spruce, Norway spruce	Eastern white pine, green ash, red pine	Imperial Carolina poplar
441B:					
Morganlake	American cranberrybush	Common lilac, eastern redcedar, nannyberry, northern white cedar	Manchurian crabapple, Black Hills spruce, white spruce, Norway spruce	Eastern white pine, green ash	Imperial Carolina poplar
Nester	Siberian peashrub, common ninebark	Common lilac, nannyberry, southern arrowwood	Blue spruce, white spruce	Manchurian crabapple, green ash, red pine, eastern white pine	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
441C:					
Morganlake	American cranberrybush	Common lilac, eastern redcedar, nannyberry, northern white cedar	Manchurian crabapple, Black Hills spruce, white spruce, Norway spruce	Eastern white pine, green ash	Imperial Carolina poplar
Nester	Siberian peashrub, common ninebark	Common lilac, nannyberry, southern arrowwood	Blue spruce, white spruce	Manchurian crabapple, green ash, red pine, eastern white pine	---
442D:					
Menominee	Common lilac, sargent crabapple	Amur maple, eastern redcedar, nannyberry	Siberian crabapple, white spruce, Norway spruce	Eastern white pine, green ash, red pine	Imperial Carolina poplar
Curtisville	Siberian peashrub, common ninebark	Common lilac, nannyberry, southern arrowwood	Blue spruce, white spruce	Manchurian crabapple, green ash, red pine, eastern white pine	---
473. Deford-Kinross					
474. Histosols-Fluvaquents					
475B:					
Graycalm	Siberian peashrub	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---
Klacking	Roselow sargent crabapple, common ninebark	Common lilac, Amur maple, nannyberry	Siberian crabapple, eastern redcedar, white spruce	Norway spruce, eastern white pine, red pine	Imperial Carolina poplar
475D:					
Graycalm	Siberian peashrub	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---
Klacking	Roselow sargent crabapple, common ninebark	Common lilac, Amur maple, nannyberry	Siberian crabapple, eastern redcedar, white spruce	Norway spruce, eastern white pine, red pine	Imperial Carolina poplar
475E:					
Graycalm	Siberian peashrub	Amur maple, common lilac, eastern redcedar	Jack pine, red pine	Eastern white pine	---
Klacking	Roselow sargent crabapple, common ninebark	Common lilac, Amur maple, nannyberry	Siberian crabapple, eastern redcedar, white spruce	Norway spruce, eastern white pine, red pine	Imperial Carolina poplar

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
476B:					
Klacking	Roselow sargent crabapple, common ninebark	Common lilac, Amur maple, nannyberry	Siberian crabapple, eastern redcedar, white spruce	Norway spruce, eastern white pine, red pine	Imperial Carolina poplar
Perecheney	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
476D:					
Klacking	Roselow sargent crabapple, common ninebark	Common lilac, Amur maple, nannyberry	Siberian crabapple, eastern redcedar, white spruce	Norway spruce, eastern white pine, red pine	Imperial Carolina poplar
Perecheney	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
490.					
Urban land-Aquents					
491A:					
Geels	---	American cranberrybush, Amur maple, common lilac, silky dogwood, nannyberry	Siberian crabapple, eastern redcedar, white spruce	Norway spruce, eastern white pine, red pine	---
492A:					
Allendale, sandy substratum	Roselow sargent crabapple	American cranberrybush, common lilac, nannyberry, northern white cedar	Blue spruce, white spruce	Manchurian crabapple, Norway spruce, eastern white pine, red maple	---
493A:					
Otisco	Roselow sargent crabapple, common ninebark, silky dogwood	American cranberrybush, nannyberry, southern arrowwood	Northern white cedar, white spruce	Manchurian crabapple, Norway spruce, eastern white pine, green ash	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
495B:					
Gerrish	---	Common lilac, Manchurian crabapple, eastern redcedar	Jack pine, red pine	Eastern white pine	---
495D:					
Gerrish	---	Common lilac, Manchurian crabapple, eastern redcedar	Jack pine, red pine	Eastern white pine	---
495F:					
Gerrish	---	Common lilac, Manchurian crabapple, eastern redcedar	Jack pine, red pine	Eastern white pine	---
496B:					
Gerrish	---	Common lilac, Manchurian crabapple, eastern redcedar	Jack pine, red pine	Eastern white pine	---
Grayling	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
496D:					
Gerrish	---	Common lilac, Manchurian crabapple, eastern redcedar	Jack pine, red pine	Eastern white pine	---
Grayling	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
496F:					
Gerrish	---	Common lilac, Manchurian crabapple, eastern redcedar	Jack pine, red pine	Eastern white pine	---

Table 10.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
496F:					
Grayling	Peking cotoneaster, Siberian peashrub, barberry, common lilac, silver buffaloberry, smooth sumac, staghorn sumac	Eastern redcedar	Jack pine, red pine, eastern white pine	---	---
497A:					
Debolt	Roselow sargent crabapple, Siberian peashrub, common lilac	Silver buffaloberry, Amur maple, Siberian crabapple, eastern redcedar	Austrian pine, green ash, jack pine, eastern white pine, red pine	---	---
498A:					
Pinewood	Common ninebark, silky dogwood	Common lilac, Amur maple, Black Hills spruce, nannyberry, northern white cedar	White spruce, Norway spruce, eastern white pine	Green ash, red maple	---
499. Dawson-Kinross					
500A:					
Flink	Sargent crabapple, silky dogwood	American cranberrybush, common lilac, nannyberry	Northern white cedar, white spruce	Manchurian crabapple, red pine, eastern white pine, green ash	---
501B:					
Kellogg, sandy substratum	American cranberrybush, Roselow sargent crabapple, Siberian peashrub, silky dogwood	Common lilac, Amur maple, eastern redcedar	Manchurian crabapple, white spruce, Norway spruce	Eastern white pine, red pine	---
502B:					
Kawkawlin	Roselow sargent crabapple, common ninebark, silky dogwood	American cranberrybush, common lilac, Amur maple, nannyberry, northern white cedar	White spruce, Norway spruce, eastern white pine, red pine	---	---
Sims.					

Table 11.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
13:					
Tawas	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.
Lupton	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.
14:					
Dawson	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.
Loxley	Severe: excess humus, ponding, too acid.	Severe: excess humus, ponding, too acid.	Severe: excess humus, ponding, too acid.	Severe: excess humus, ponding.	Severe: excess humus, ponding, too acid.
15A:					
Croswell	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
Au Gres	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: wetness.
16B:					
Graycalm	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
17A:					
Croswell	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
18A:					
Au Gres	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: wetness.
20B:					
Graycalm	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Grayling	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: droughty, too acid.
20D:					
Graycalm	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
Grayling	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: droughty, too acid.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
20F:					
Graycalm	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: droughty, slope.
Grayling	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: droughty, too acid.
23:					
Ausable	Severe: excess humus, flooding, ponding.	Severe: excess humus, ponding.	Severe: excess humus, flooding, ponding.	Severe: excess humus, ponding.	Severe: excess humus, flooding, ponding.
Bowstring	Severe: excess humus, flooding, wetness.	Severe: excess humus, wetness.	Severe: excess humus, flooding, wetness.	Severe: excess humus, wetness.	Severe: excess humus, flooding, wetness.
24A:					
Kinross	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
Au Gres	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: wetness.
26B:					
Cublake	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
34B:					
Kneff	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight	Slight.
35:					
Kinross	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
47D:					
Graycalm	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
47F:					
Graycalm	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: droughty, slope.
50B:					
Au Gres	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: wetness.
Kinross	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
50B:					
Croswell	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
51:					
Tawas	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.
Leafriver	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.
57B:					
Kawkawlin	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
58A:					
Wakeley	Severe: excess humus, percs slowly, ponding.	Severe: percs slowly, ponding.	Severe: percs slowly, ponding.	Severe: ponding.	Severe: excess humus, ponding.
Allendale	Severe: percs slowly, too sandy, wetness.	Severe: percs slowly, too sandy, wetness.	Severe: percs slowly, too sandy, wetness.	Severe: too sandy, wetness.	Severe: wetness.
67A:					
Bowers	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Deerheart	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
75B:					
Rubicon	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
75D:					
Rubicon	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
78.					
Pits					
81B:					
Grayling	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: droughty, too acid.
81D:					
Grayling	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: droughty, too acid.
81F:					
Grayling	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: droughty, too acid.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
82B. Udorthents					
83B: Udipsamments	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
83F. Udipsamments					
86: Histosols	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.
Aquents	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
87: Ausable	Severe: excess humus, flooding, ponding.	Severe: excess humus, ponding.	Severe: excess humus, flooding, ponding.	Severe: excess humus, ponding.	Severe: excess humus, flooding, ponding.
90B: Chinwhisker	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
102D: Curtisville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
103B: Nester	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
103C: Nester	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
114A: Ingalls	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: wetness.
120B: Morganlake	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: too acid.
120C: Morganlake	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: too acid.
123D: Klacking	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, too sandy.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
144B:					
Perecheney	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, large stones, too sandy.
144C:					
Perecheney	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, large stones, too sandy.
159A:					
Finch	Severe: cemented pan, too sandy, wetness.	Severe: cemented pan, too sandy, wetness.	Severe: cemented pan, too sandy, wetness.	Severe: too sandy, wetness.	Severe: cemented pan, droughty, wetness.
307B:					
Klacking	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, too sandy.
307E:					
Klacking	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, too sandy.
360:					
Wakeley	Severe: percs slowly, ponding.	Severe: percs slowly, ponding, too sandy.	Severe: percs slowly, ponding, too sandy.	Severe: ponding, too sandy.	Severe: ponding.
368A:					
Au Gres	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: wetness.
Deford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
369:					
Deford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
380. Access denied					
382B:					
Proper	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
408:					
Sims	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
410B:					
Proper	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Finch	Severe: cemented pan, too sandy, wetness.	Severe: cemented pan, too sandy, wetness.	Severe: cemented pan, too sandy, wetness.	Severe: too sandy, wetness.	Severe: cemented pan, droughty, wetness.
Deford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
429D:					
Menominee	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: slope.
441B:					
Morganlake	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: too acid.
Nester	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
441C:					
Morganlake	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: too acid.
Nester	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
442D:					
Menominee	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: slope.
Curtisville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
473:					
Deford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
Kinross	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
474:					
Histosols	Severe: excess humus, flooding, ponding.	Severe: excess humus, ponding.	Severe: excess humus, flooding, ponding.	Severe: excess humus, ponding.	Severe: excess humus, flooding, ponding.
Fluvaquents	Severe: flooding, ponding.	Severe: ponding.	Severe: flooding, ponding.	Severe: ponding.	Severe: flooding, ponding.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
475B:					
Graycalm	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Klacking	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, too sandy.
475D:					
Graycalm	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
Klacking	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, too sandy.
475E:					
Graycalm	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: droughty, slope.
Klacking	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, too sandy.
476B:					
Klacking	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, too sandy.
Perecheney	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, large stones, too sandy.
476D:					
Klacking	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope, too sandy.
Perecheney	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, large stones, too sandy.
490:					
Urban land.					
Aquents	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
491A:					
Geels	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Moderate: droughty.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
492A:					
Allendale, sandy substratum	Severe: percs slowly, too sandy, wetness.	Severe: percs slowly, too sandy, wetness.	Severe: percs slowly, too sandy, wetness.	Severe: too sandy, wetness.	Severe: wetness.
493A:					
Otisco	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: too sandy, wetness.	Severe: wetness.
495B:					
Gerrish	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
495D:					
Gerrish	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
495F:					
Gerrish	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
496B:					
Gerrish	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Grayling	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: droughty, too acid.
496D:					
Gerrish	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Grayling	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: droughty, too acid.
496F:					
Gerrish	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Grayling	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too acid, too sandy.	Severe: too sandy.	Severe: droughty, too acid.
497A:					
Debolt	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
498A:					
Pinewood	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: droughty, wetness.
499:					
Dawson	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
499:					
Kinross	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
500A:					
Flink	Severe: too sandy, wetness.	Moderate: too sandy.	Severe: too sandy, wetness.	Moderate: too sandy.	Moderate: droughty, wetness.
501B:					
Kellogg, sandy substratum	Severe: percs slowly, too sandy.	Severe: percs slowly, too sandy.	Severe: percs slowly, too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
502B:					
Kawkawlin	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Sims	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

Table 12.--Wildlife Habitat

(Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
13:										
Tawas	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Lupton	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
14:										
Dawson	Very poor	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair
Loxley	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
15A:										
Croswell	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
Au Gres	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
16B:										
Graycalm	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor
17A:										
Croswell	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
18A:										
Au Gres	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
20B:										
Graycalm	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Grayling	Poor	Poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
20D:										
Graycalm	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Grayling	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
20F:										
Graycalm	Very poor	Poor	Fair	Good	Good	Very poor	Very poor	Very poor	Good	Very poor
Grayling	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
23:										
Ausable	Very poor	Poor	Poor	Poor	Poor	Fair	Good	Poor	Poor	Fair
Bowstring	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
24A:										
Kinross	Very poor	Poor	Poor	Fair	Fair	Good	Good	Very poor	Fair	Good
Au Gres	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
26B:										
Cublake	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
34B:										
Kneff	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
35:										
Kinross	Very poor	Poor	Poor	Fair	Fair	Good	Good	Very poor	Fair	Good
47D:										
Graycalm	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor
47F:										
Graycalm	Very poor	Poor	Fair	Good	Good	Very poor	Very poor	Very poor	Good	Very poor
50B:										
Au Gres	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
Kinross	Very poor	Poor	Poor	Fair	Fair	Good	Good	Very poor	Fair	Good
Croswell	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
51:										
Tawas	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
Leafriver	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
57B:										
Kawkawlin	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
58A:										
Wakeley	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
Allendale	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor
67A:										
Bowers	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair
Deerheart	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
75B:										
Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
75D:										
Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
78. Pits										
81B: Grayling	Poor	Poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
81D: Grayling	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
81F: Grayling	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
82B. Udorthents										
83B, 83F. Udipsamments										
86. Histosols and Aquents										
87: Ausable	Very poor	Poor	Poor	Poor	Poor	Fair	Good	Poor	Poor	Fair
90B: Chinwhisker	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor
102D: Curtisville	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
103B: Nester	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
103C: Nester	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
114A: Ingalls	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair
120B: Morganlake	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
120C: Morganlake	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
123D: Klacking	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
144B:										
Perecheney	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
144C:										
Perecheney	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
159A:										
Finch	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor
307B:										
Klacking	Fair	Fair	Fair	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor
307E:										
Klacking	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
360:										
Wakeley	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
368A:										
Au Gres	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
Deford	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
369:										
Deford	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
380.										
Access denied										
382B:										
Proper	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
408:										
Sims	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
410B:										
Proper	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
Finch	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor
Deford	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
429D:										
Menominee	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
441B:										
Morganlake	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Nester	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
441C:										
Morganlake	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Nester	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
442D:										
Menominee	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Curtisville	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
473:										
Deford	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
Kinross	Very poor	Poor	Poor	Fair	Fair	Good	Good	Very poor	Fair	Good
474.										
Histosols-Fluvaquents										
475B:										
Graycalm	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Klacking	Fair	Fair	Fair	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor
475D:										
Graycalm	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Klacking	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
475E:										
Graycalm	Very poor	Poor	Fair	Good	Good	Very poor	Very poor	Very poor	Good	Very poor
Klacking	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
476B:										
Klacking	Fair	Fair	Fair	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor
Perecheney	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
476D:										
Klacking	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Perecheney	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life
490. Urban land- Aquents										
491A: Geels	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
492A: Allendale, sandy substratum	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
493A: Otisco	Poor	Fair	Good	Fair	Good	Poor	Very poor	Fair	Fair	Very poor
495B: Gerrish	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor
495D: Gerrish	Very poor	Poor	Fair	Good	Good	Very poor	Very poor	Very poor	Good	Very poor
495F: Gerrish	Very poor	Poor	Fair	Good	Good	Very poor	Very poor	Very poor	Good	Very poor
496B: Gerrish	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Grayling	Poor	Poor	Fair	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
496D: Gerrish	Very poor	Poor	Fair	Good	Good	Very poor	Very poor	Very poor	Good	Very poor
Grayling	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
496F: Gerrish	Very poor	Poor	Fair	Good	Good	Very poor	Very poor	Very poor	Good	Very poor
Grayling	Very poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
497A: Debolt	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
498A: Pinewood	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair
499: Dawson	Very poor	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life
499:										
Kinross	Very poor	Poor	Poor	Fair	Fair	Good	Good	Very poor	Fair	Good
500A:										
Flink	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
501B:										
Kellogg, sandy substratum	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
502B:										
Kawkawlin	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Sims	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good

Table 13.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
13:						
Tawas	Severe: cutbanks cave, excess humus, ponding.	Severe: low strength, ponding, subsides.	Severe: ponding, subsides.	Severe: low strength, ponding, subsides.	Severe: frost action, ponding, subsides.	Severe: excess humus, ponding.
Lupton	Severe: excess humus, ponding.	Severe: low strength, ponding, subsides.	Severe: low strength, ponding, subsides.	Severe: low strength, ponding, subsides.	Severe: frost action, ponding, subsides.	Severe: excess humus, ponding.
14:						
Dawson	Severe: cutbanks cave, excess humus, ponding.	Severe: low strength, ponding, subsides.	Severe: ponding, subsides.	Severe: low strength, ponding, subsides.	Severe: frost action, ponding, subsides.	Severe: excess humus, ponding.
Loxley	Severe: excess humus, ponding.	Severe: low strength, ponding, subsides.	Severe: low strength, ponding, subsides.	Severe: low strength, ponding, subsides.	Severe: frost action, ponding, subsides.	Severe: excess humus, ponding, too acid.
15A:						
Croswell	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
Au Gres	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
16B:						
Graycalm	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
17A:						
Croswell	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
18A:						
Au Gres	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
20B:						
Graycalm	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
Grayling	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty, too acid.

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
20D:						
Graycalm	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
Grayling	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty, too acid.
20F:						
Graycalm	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Grayling	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty, too acid.
23:						
Ausable	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: excess humus, flooding, ponding.
Bowstring	Severe: cutbanks cave, excess humus, wetness.	Severe: flooding, subsides, wetness.	Severe: flooding, subsides, wetness.	Severe: flooding, subsides, wetness.	Severe: flooding, subsides, wetness.	Severe: excess humus, flooding, wetness.
24A:						
Kinross	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
Au Gres	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
26B:						
Cublake	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
34B:						
Kneff	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action, low strength.	Slight.
35:						
Kinross	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
47D:						
Graycalm	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
47F:						
Graycalm	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
50B:						
Au Gres	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Kinross	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
Croswell	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
51:						
Tawas	Severe: cutbanks cave, excess humus, ponding.	Severe: low strength, ponding, subsides.	Severe: ponding, subsides.	Severe: low strength, ponding, subsides.	Severe: frost action, ponding, subsides.	Severe: excess humus, ponding.
Leafriver	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, ponding.	Severe: excess humus, ponding.
57B:						
Kawkawlin	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
58A:						
Wakeley	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
Allendale	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
67A:						
Bowers	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
Deerheart	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, low strength, ponding.	Severe: ponding.
75B:						
Rubicon	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
75D:						
Rubicon	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
78. Pits						
81B:						
Grayling	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty, too acid.

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
81D:						
Grayling	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty, too acid.
81F:						
Grayling	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty, too acid.
82B.						
Udorthents						
83B:						
Udipsamments	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
83F.						
Udipsamments						
86:						
Histosols	Severe: excess humus, ponding.	Severe: low strength, ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: frost action, ponding.	Severe: excess humus, ponding.
Aquents	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, ponding.	Severe: ponding.
87:						
Ausable	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: excess humus, flooding, ponding.
90B:						
Chinwhisker	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
102D:						
Curtisville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
103B:						
Nester	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
103C:						
Nester	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
114A:						
Ingalls	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
120B:						
Morganlake	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: too acid.

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
120C:						
Morganlake---------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: too acid.
123D:						
Klacking-----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
144B:						
Perecheney---------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, large stones, too sandy.
144C:						
Perecheney---------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: droughty, large stones, too sandy.
159A:						
Finch--------------	Severe: cemented pan, cutbanks cave, wetness.	Severe: wetness.	Severe: cemented pan, wetness.	Severe: wetness.	Severe: wetness.	Severe: cemented pan, droughty, wetness.
307B:						
Klacking-----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
307E:						
Klacking-----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
360:						
Wakeley------------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding.	Severe: ponding.	Severe: ponding.
368A:						
Au Gres------------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Deford-------------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
369:						
Deford-------------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
380.						
Access denied						

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
382B:						
Proper	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
408:						
Sims	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, low strength, ponding.	Severe: ponding.
410B:						
Proper	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
Finch	Severe: cemented pan, cutbanks cave, wetness.	Severe: wetness.	Severe: cemented pan, wetness.	Severe: wetness.	Severe: wetness.	Severe: cemented pan, droughty, wetness.
Deford	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
429D:						
Menominee	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
441B:						
Morganlake	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: too acid.
Nester	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
441C:						
Morganlake	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: too acid.
Nester	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
442D:						
Menominee	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Curtisville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
473:						
Deford	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
Kinross	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
474:						
Histosols----------	Severe: excess humus, ponding.	Severe: flooding, low strength, ponding.	Severe: flooding, ponding.	Severe: flooding, low strength, ponding.	Severe: flooding, frost action, ponding.	Severe: excess humus, flooding, ponding.
Fluvaquents--------	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.
475B:						
Graycalm-----------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
Klacking-----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
475D:						
Graycalm-----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
Klacking-----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
475E:						
Graycalm-----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Klacking-----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
476B:						
Klacking-----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
Perecheney---------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, large stones, too sandy.
476D:						
Klacking-----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
Perecheney---------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Severe: slope.	Moderate: wetness.	Moderate: droughty, large stones, too sandy.

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
490:						
Urban land.						
Aquents	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, ponding.	Severe: ponding.
491A:						
Geels	Severe: cutbanks cave.	Slight	Severe: shrink-swell.	Slight	Slight	Moderate: droughty.
492A:						
Allendale, sandy substratum	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
493A:						
Otisco	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
495B:						
Gerrish	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
495D:						
Gerrish	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
495F:						
Gerrish	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
496B:						
Gerrish	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
Grayling	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty, too acid.
496D:						
Gerrish	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
Grayling	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty, too acid.
496F:						
Gerrish	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
Grayling	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty, too acid.
497A:						
Debolt	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: droughty.

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
498A:						
Pinewood	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: droughty, wetness.
499:						
Dawson	Severe: cutbanks cave, excess humus, ponding.	Severe: low strength, ponding, subsides.	Severe: ponding, subsides.	Severe: low strength, ponding, subsides.	Severe: frost action, ponding, subsides.	Severe: excess humus, ponding.
Kinross	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: excess humus, ponding.
500A:						
Flink	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: frost action, wetness.	Moderate: droughty, wetness.
501B:						
Kellogg, sandy substratum	Severe: cutbanks cave.	Slight	Severe: shrink-swell.	Slight	Slight	Moderate: droughty, too sandy.
502B:						
Kawkawlin	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
Sims	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, low strength, ponding.	Severe: ponding.

Table 14.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
13:					
Tawas	Severe: percs slowly, ponding, subsides.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.
Lupton	Severe: percs slowly, ponding, subsides.	Severe: excess humus, ponding, seepage.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage.	Poor: excess humus, ponding.
14:					
Dawson	Severe: percs slowly, ponding, subsides.	Severe: excess humus, ponding, seepage.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage.	Poor: excess humus, ponding.
Loxley	Severe: percs slowly, ponding, subsides.	Severe: excess humus, ponding, seepage.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage.	Poor: excess humus, ponding, too acid.
15A:					
Croswell	Severe: poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Au Gres	Severe: poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
16B:					
Graycalm	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
17A:					
Croswell	Severe: poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy.
18A:					
Au Gres	Severe: poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
20B:					
Graycalm	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Grayling	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
20D:					
Graycalm-----------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Grayling-----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
20F:					
Graycalm-----------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, slope, too sandy.
Grayling-----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
23:					
Ausable------------	Severe: flooding, ponding, poor filter.	Severe: excess humus, flooding, seepage.	Severe: flooding, ponding, seepage.	Severe: flooding, ponding, seepage.	Poor: ponding, seepage, too sandy.
Bowstring----------	Severe: flooding, percs slowly, wetness.	Severe: excess humus, flooding, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: excess humus, wetness.
24A:					
Kinross------------	Severe: ponding, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.
Au Gres------------	Severe: poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
26B:					
Cublake------------	Severe: percs slowly, poor filter, wetness.	Severe: seepage, wetness.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
34B:					
Kneff--------------	Severe: percs slowly, wetness.	Severe: wetness.	Severe: seepage.	Moderate: wetness.	Fair: too clayey, wetness.
35:					
Kinross------------	Severe: ponding, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
47D:					
Graycalm	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
47F:					
Graycalm	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, slope, too sandy.
50B:					
Au Gres	Severe: poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Kinross	Severe: ponding, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.
Croswell	Severe: poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy.
51:					
Tawas	Severe: percs slowly, ponding, subsides.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.
Leafriver	Severe: ponding, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.
57B:					
Kawkawlin	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
58A:					
Wakeley	Severe: percs slowly, ponding, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, too clayey.	Severe: ponding, seepage.	Poor: hard to pack, ponding, too clayey.
Allendale	Severe: percs slowly, poor filter, wetness.	Severe: seepage.	Severe: too clayey, wetness.	Severe: seepage, wetness.	Poor: hard to pack, too clayey, wetness.
67A:					
Bowers	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Deerheart	Severe: percs slowly, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
75B:					
Rubicon------------	Severe: poor filter.	Severe: large stones, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
75D:					
Rubicon------------	Severe: poor filter.	Severe: large stones, seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
78. Pits					
81B:					
Grayling-----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
81D:					
Grayling-----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
81F:					
Grayling-----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
82B. Udorthents					
83B:					
Udipsamments-------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
83F. Udipsamments					
86:					
Histosols----------	Severe: ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: ponding.	Poor: excess humus, ponding.
Aquents------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
87:					
Ausable------------	Severe: flooding, ponding, poor filter.	Severe: excess humus, flooding, seepage.	Severe: flooding, ponding, seepage.	Severe: flooding, ponding, seepage.	Poor: ponding, seepage, too sandy.
90B:					
Chinwhisker--------	Severe: poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy.
102D:					
Curtisville--------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
103B:					
Nester-------------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: small stones, too clayey.
103C:					
Nester-------------	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: small stones, too clayey.
114A:					
Ingalls------------	Severe: percs slowly, poor filter, wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
120B:					
Morganlake---------	Severe: percs slowly, poor filter, wetness.	Severe: seepage, wetness.	Severe: too acid.	Severe: seepage.	Fair: too clayey, wetness.
120C:					
Morganlake---------	Severe: percs slowly, poor filter, wetness.	Severe: seepage, wetness.	Severe: too acid.	Severe: seepage.	Fair: too clayey, wetness.
123D:					
Klacking-----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
144B:					
Perecheney---------	Severe: percs slowly, poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
144C:					
Perecheney---------	Severe: percs slowly, poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
159A:					
Finch--------------	Severe: cemented pan, poor filter, wetness.	Severe: cemented pan, seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: cemented pan, seepage, wetness.	Poor: cemented pan, seepage, too sandy.
307B:					
Klacking-----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
307E:					
Klacking-----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
360:					
Wakeley	Severe: percs slowly, ponding, poor filter.	Severe: ponding, seepage.	Severe: ponding, too clayey.	Severe: ponding, seepage.	Poor: hard to pack, ponding, too clayey.
368A:					
Au Gres	Severe: poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Deford	Severe: ponding, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.
369:					
Deford	Severe: ponding, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.
380. Access denied					
382B:					
Proper	Severe: poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy.
408:					
Sims	Severe: percs slowly, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
410B:					
Proper	Severe: poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Finch	Severe: cemented pan, poor filter, wetness.	Severe: cemented pan, seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: cemented pan, seepage, wetness.	Poor: cemented pan, seepage, too sandy.
Deford	Severe: ponding, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.
429D:					
Menominee	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
441B:					
Morganlake	Severe: percs slowly, poor filter, wetness.	Severe: seepage, wetness.	Severe: too acid.	Severe: seepage.	Fair: too clayey, wetness.

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
441B:					
Nester	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: small stones, too clayey.
441C:					
Morganlake	Severe: percs slowly, poor filter, wetness.	Severe: seepage, wetness.	Severe: too acid.	Severe: seepage.	Fair: too clayey, wetness.
Nester	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: small stones, too clayey.
442D:					
Menominee	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: slope.
Curtisville	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
473:					
Deford	Severe: ponding, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.
Kinross	Severe: ponding, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.
474:					
Histosols	Severe: flooding, ponding.	Severe: excess humus, flooding, ponding.	Severe: excess humus, flooding, ponding.	Severe: flooding, ponding.	Poor: excess humus, ponding.
Fluvaquents	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
475B:					
Graycalm	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Klacking	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
475D:					
Graycalm	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Klacking	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
475E:					
Graycalm-----------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, slope, too sandy.
Klacking-----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
476B:					
Klacking-----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Perecheney---------	Severe: percs slowly, poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
476D:					
Klacking-----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Perecheney---------	Severe: percs slowly, poor filter, wetness.	Severe: seepage, slope, wetness.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
490:					
Urban land.					
Aquents------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
491A:					
Geels--------------	Severe: percs slowly, poor filter.	Severe: seepage.	Severe: too clayey.	Severe: seepage.	Poor: hard to pack, too clayey.
492A:					
Allendale, sandy substratum--------	Severe: percs slowly, poor filter, wetness.	Severe: seepage.	Severe: too clayey, wetness.	Severe: seepage, wetness.	Poor: hard to pack, too clayey, wetness.
493A:					
Otisco-------------	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
495B:					
Gerrish------------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
495D:					
Gerrish------------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
495F:					
Gerrish	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
496B:					
Gerrish	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Grayling	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
496D:					
Gerrish	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Grayling	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
496F:					
Gerrish	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Grayling	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
497A:					
Debolt	Severe: percs slowly, poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.
498A:					
Pinewood	Severe: percs slowly, poor filter, wetness.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
499:					
Dawson	Severe: percs slowly, ponding, subsides.	Severe: excess humus, ponding, seepage.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage.	Poor: excess humus, ponding.
Kinross	Severe: ponding, poor filter.	Severe: excess humus, ponding, seepage.	Severe: ponding, seepage, too sandy.	Severe: ponding, seepage.	Poor: ponding, seepage, too sandy.
500A:					
Flink	Severe: percs slowly, poor filter, wetness.	Severe: seepage, wetness.	Severe: too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
501B:					
Kellogg, sandy substratum--------	Severe: percs slowly, poor filter, wetness.	Severe: seepage.	Severe: too clayey.	Severe: seepage.	Poor: hard to pack, too clayey.
502B:					
Kawkawlin----------	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Sims---------------	Severe: percs slowly, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.

Table 15.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
13:				
Tawas	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Lupton	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
14:				
Dawson	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Loxley	Poor: low strength, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, too acid, wetness.
15A:				
Croswell	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Au Gres	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
16B:				
Graycalm	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
17A:				
Croswell	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
18A:				
Au Gres	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
20B:				
Graycalm	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
Grayling	Good	Probable	Improbable: too sandy.	Poor: too sandy.
20D:				
Graycalm	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
Grayling	Good	Probable	Improbable: too sandy.	Poor: too sandy.

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
20F:				
Graycalm	Poor: slope.	Probable	Improbable: too sandy.	Poor: slope, small stones, too sandy.
Grayling	Good	Probable	Improbable: too sandy.	Poor: too sandy.
23:				
Ausable	Poor: wetness.	Probable	Improbable: too sandy.	Poor: small stones, too sandy, wetness.
Bowstring	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
24A:				
Kinross	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Au Gres	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
26B:				
Cublake	Fair: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
34B:				
Kneff	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
35:				
Kinross	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
47D:				
Graycalm	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
47F:				
Graycalm	Poor: slope.	Probable	Improbable: too sandy.	Poor: slope, small stones, too sandy.
50B:				
Au Gres	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Kinross	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
50B:				
Croswell	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
51:				
Tawas	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Leafriver	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
57B:				
Kawkawlin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
58A:				
Wakeley	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
Allendale	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
67A:				
Bowers	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Deerheart	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
75B:				
Rubicon	Good	Probable	Improbable: too sandy.	Poor: area reclaim, small stones, too sandy.
75D:				
Rubicon	Good	Probable	Improbable: too sandy.	Poor: area reclaim, small stones, too sandy.
78.				
Pits				
81B:				
Grayling	Good	Probable	Improbable: too sandy.	Poor: too sandy.
81D:				
Grayling	Good	Probable	Improbable: too sandy.	Poor: too sandy.
81F:				
Grayling	Good	Probable	Improbable: too sandy.	Poor: too sandy.

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
82B. Udorthents				
83B: Udipsamments	Good	Probable	Improbable: too sandy.	Poor: too sandy.
83F. Udipsamments				
86: Histosols	Poor: low strength, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
Aquents	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
87: Ausable	Poor: wetness.	Probable	Improbable: too sandy.	Poor: small stones, too sandy, wetness.
90B: Chinwhisker	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
102D: Curtisville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too clayey.
103B: Nester	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
103C: Nester	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
114A: Ingalls	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
120B: Morganlake	Fair: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too acid, too sandy.
120C: Morganlake	Fair: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too acid, too sandy.
123D: Klacking	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
144B:				
Perecheney	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
144C:				
Perecheney	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
159A:				
Finch	Poor: wetness.	Probable	Improbable: too sandy.	Poor: area reclaim, cemented pan, too sandy.
307B:				
Klacking	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
307E:				
Klacking	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
360:				
Wakeley	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
368A:				
Au Gres	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Deford	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
369:				
Deford	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
380.				
Access denied				
382B:				
Proper	Fair: wetness.	Probable	Improbable: too sandy.	Poor: area reclaim, too sandy.
408:				
Sims	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
410B:				
Proper	Fair: wetness.	Probable	Improbable: too sandy.	Poor: area reclaim, too sandy.

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
410B:				
Finch	Poor: wetness.	Probable	Improbable: too sandy.	Poor: area reclaim, cemented pan, too sandy.
Deford	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
429D:				
Menominee	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
441B:				
Morganlake	Fair: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too acid, too sandy.
Nester	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
441C:				
Morganlake	Fair: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too acid, too sandy.
Nester	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
442D:				
Menominee	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Curtisville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too clayey.
473:				
Deford	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Kinross	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
474:				
Histosols	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
Fluvaquents	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
475B:				
Graycalm	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
Klacking	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
475D:				
Graycalm	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
Klacking	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
475E:				
Graycalm	Poor: slope.	Probable	Improbable: too sandy.	Poor: slope, small stones, too sandy.
Klacking	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
476B:				
Klacking	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
Perecheney	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
476D:				
Klacking	Good	Probable	Improbable: too sandy.	Poor: small stones, too sandy.
Perecheney	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
490:				
Urban land.				
Aquents	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
491A:				
Geels	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
492A:				
Allendale, sandy substratum	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
493A:				
Otisco	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
495B:				
Gerrish	Good	Probable	Improbable: thin layer, too sandy.	Poor: small stones, too sandy.
495D:				
Gerrish	Good	Probable	Improbable: thin layer, too sandy.	Poor: small stones, too sandy.
495F:				
Gerrish	Good	Probable	Improbable: thin layer, too sandy.	Poor: small stones, too sandy.
496B:				
Gerrish	Good	Probable	Improbable: thin layer, too sandy.	Poor: small stones, too sandy.
Grayling	Good	Probable	Improbable: too sandy.	Poor: too sandy.
496D:				
Gerrish	Good	Probable	Improbable: thin layer, too sandy.	Poor: small stones, too sandy.
Grayling	Good	Probable	Improbable: too sandy.	Poor: too sandy.
496F:				
Gerrish	Good	Probable	Improbable: thin layer, too sandy.	Poor: small stones, too sandy.
Grayling	Good	Probable	Improbable: too sandy.	Poor: too sandy.
497A:				
Debolt	Good	Probable	Probable	Poor: area reclaim, too clayey.
498A:				
Pinewood	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too clayey.
499:				
Dawson	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Kinross	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
500A:				
Flink	Fair: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
501B:				
Kellogg, sandy substratum	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
502B:				
Kawkawlin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Sims	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

Table 16.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
13:							
Tawas	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave, slow refill.	Limitation: frost action, ponding, subsides.	Limitation: ponding, soil blowing.	Limitation: ponding, soil blowing, too sandy.	Limitation: wetness.
Lupton	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Limitation: frost action, ponding, subsides.	Limitation: ponding, soil blowing.	Limitation: ponding, soil blowing.	Limitation: wetness.
14:							
Dawson	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave, slow refill.	Limitation: frost action, ponding, subsides.	Limitation: ponding, rooting depth.	Limitation: ponding.	Limitation: rooting depth, wetness.
Loxley	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Limitation: frost action, ponding, subsides.	Limitation: ponding, too acid.	Limitation: ponding.	Limitation: wetness.
15A:							
Croswell	Severe: seepage.	Severe: piping, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: too sandy, wetness.	Limitation: droughty.
Au Gres	Severe: seepage.	Severe: piping, seepage, wetness.	Severe: cutbanks cave.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: soil blowing, too sandy, wetness.	Limitation: droughty, wetness.
16B:							
Graycalm	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
17A:							
Croswell	Severe: seepage.	Severe: piping, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: too sandy, wetness.	Limitation: droughty.
18A:							
Au Gres	Severe: seepage.	Severe: piping, seepage, wetness.	Severe: cutbanks cave.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: soil blowing, too sandy, wetness.	Limitation: droughty, wetness.
20B:							
Graycalm	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.
Grayling	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.
20D:							
Graycalm	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
Grayling	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.
20F:							
Graycalm	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
Grayling	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
23:							
Ausable------------	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, flooding, ponding.	Limitation: flooding, ponding, soil blowing.	Limitation: ponding, soil blowing, too sandy.	Limitation: wetness.
Bowstring----------	Severe: seepage.	Severe: excess humus, wetness.	Severe: cutbanks cave, slow refill.	Limitation: flooding, frost action, subsides.	Limitation: flooding, wetness.	Limitation: wetness.	Limitation: wetness.
24A:							
Kinross------------	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, ponding.	Limitation: ponding.	Limitation: ponding, soil blowing, too sandy.	Limitation: wetness.
Au Gres------------	Severe: seepage.	Severe: piping, seepage, wetness.	Severe: cutbanks cave.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: soil blowing, too sandy, wetness.	Limitation: droughty, wetness.
26B:							
Cublake------------	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: cutbanks cave, slope.	Limitation: droughty, slope, wetness.	Limitation: soil blowing, too sandy, wetness.	Limitation: droughty.
34B:							
Kneff--------------	Moderate: slope.	Severe: piping.	Severe: no water.	Limitation: frost action, slope.	Limitation: slope, soil blowing, wetness.	Limitation: erodes easily, soil blowing, wetness.	Limitation: erodes easily.
35:							
Kinross------------	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, ponding.	Limitation: ponding.	Limitation: ponding, soil blowing, too sandy.	Limitation: wetness.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
47D:							
Graycalm	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
47F:							
Graycalm	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
50B:							
Au Gres	Severe: seepage.	Severe: piping, seepage, wetness.	Severe: cutbanks cave.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: soil blowing, too sandy, wetness.	Limitation: droughty, wetness.
Kinross	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, ponding.	Limitation: ponding.	Limitation: ponding, soil blowing, too sandy.	Limitation: wetness.
Croswell	Severe: seepage.	Severe: piping, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: too sandy, wetness.	Limitation: droughty.
51:							
Tawas	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave, slow refill.	Limitation: frost action, ponding, subsides.	Limitation: ponding, soil blowing.	Limitation: ponding, soil blowing, too sandy.	Limitation: wetness.
Leafriver	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: frost action, ponding, subsides.	Limitation: ponding, soil blowing.	Limitation: ponding, soil blowing, too sandy.	Limitation: wetness.
57B:							
Kawkawlin	Slight	Severe: wetness.	Severe: slow refill.	Limitation: frost action, percs slowly.	Limitation: wetness.	Limitation: erodes easily, percs slowly, wetness.	Limitation: erodes easily, percs slowly, wetness.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
58A:							
Wakeley	Severe: seepage.	Severe: ponding.	Severe: no water.	Limitation: percs slowly, ponding.	Limitation: droughty, ponding.	Limitation: percs slowly, ponding, soil blowing.	Limitation: droughty, percs slowly, wetness.
Allendale	Severe: seepage.	Severe: hard to pack, wetness.	Severe: no water.	Limitation: percs slowly.	Limitation: droughty, wetness.	Limitation: percs slowly, soil blowing, wetness.	Limitation: droughty, percs slowly, wetness.
67A:							
Bowers	Slight	Severe: wetness.	Severe: slow refill.	Limitation: frost action, percs slowly.	Limitation: wetness.	Limitation: percs slowly, wetness.	Limitation: percs slowly, wetness.
Deerheart	Slight	Severe: ponding.	Severe: cutbanks cave, slow refill.	Limitation: frost action, percs slowly, ponding.	Limitation: erodes easily, percs slowly, ponding.	Limitation: erodes easily, percs slowly, ponding.	Limitation: erodes easily, percs slowly, wetness.
75B:							
Rubicon	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.
75D:							
Rubicon	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
78.							
Pits							
81B:							
Grayling	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
81D:							
Grayling	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.
81F:							
Grayling	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.
82B. Udorthents							
83B:							
Udipsamments	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake.	Limitation: soil blowing, too sandy.	Limitation: droughty.
83F. Udipsamments							
86:							
Histosols	Slight	Severe: excess humus, ponding.	Slight	Limitation: frost action, ponding.	Limitation: ponding, soil blowing.	Limitation: ponding, soil blowing.	Limitation: wetness.
Aquents	Slight	Severe: ponding.	Slight	Limitation: frost action, ponding.	Limitation: ponding.	Limitation: ponding.	Limitation: wetness.
87:							
Ausable	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, flooding, ponding.	Limitation: flooding, ponding, soil blowing.	Limitation: ponding, soil blowing, too sandy.	Limitation: wetness.
90B:							
Chinwhisker	Severe: seepage.	Severe: piping, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: soil blowing, too sandy, wetness.	Limitation: droughty.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
102D:							
Curtisville--------	Severe: slope.	Slight--------	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, slope.	Limitation: percs slowly, slope.	Limitation: percs slowly, slope.
103B:							
Nester------------	Moderate: slope.	Slight--------	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, slope.	Limitation: percs slowly, soil blowing.	Limitation: percs slowly.
103C:							
Nester------------	Moderate: slope.	Slight--------	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, slope.	Limitation: percs slowly, soil blowing.	Limitation: percs slowly.
114A:							
Ingalls-----------	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave, slow refill.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: erodes easily, soil blowing, wetness.	Limitation: droughty, erodes easily, wetness.
120B:							
Morganlake---------	Severe: seepage.	Moderate: piping, wetness.	Severe: no water.	Limitation: slope, too acid.	Limitation: droughty, slope, wetness.	Limitation: erodes easily, wetness.	Limitation: droughty, erodes easily.
120C:							
Morganlake---------	Severe: seepage.	Moderate: piping, wetness.	Severe: no water.	Limitation: slope, too acid.	Limitation: droughty, slope, wetness.	Limitation: erodes easily, wetness.	Limitation: droughty, erodes easily.
123D:							
Klacking-----------	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
144B:							
Perecheney---------	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: cutbanks cave, slope.	Limitation: droughty, slope, wetness.	Limitation: erodes easily, too sandy, wetness.	Limitation: droughty, erodes easily.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
144C:							
Perecheney	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: cutbanks cave, slope.	Limitation: droughty, slope, wetness.	Limitation: erodes easily, too sandy, wetness.	Limitation: droughty, erodes easily.
159A:							
Finch	Severe: cemented pan, seepage.	Severe: piping, seepage, wetness.	Severe: no water.	Limitation: cemented pan, cutbanks cave.	Limitation: droughty, wetness.	Limitation: cemented pan, too sandy, wetness.	Limitation: cemented pan, droughty, wetness.
307B:							
Klacking	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
307E:							
Klacking	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
360:							
Wakeley	Severe: seepage.	Severe: ponding.	Severe: no water.	Limitation: percs slowly, ponding.	Limitation: droughty, fast intake, ponding.	Limitation: percs slowly, ponding, soil blowing.	Limitation: droughty, percs slowly, wetness.
368A:							
Au Gres	Severe: seepage.	Severe: piping, seepage, wetness.	Severe: cutbanks cave.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: soil blowing, too sandy, wetness.	Limitation: droughty, wetness.
Deford	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, ponding.	Limitation: droughty, ponding.	Limitation: ponding, soil blowing, too sandy.	Limitation: droughty, wetness.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
369:							
Deford-------------	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, ponding.	Limitation: droughty, ponding.	Limitation: ponding, soil blowing, too sandy.	Limitation: droughty, wetness.
380. Access denied							
382B:							
Proper-------------	Severe: seepage.	Severe: piping, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, slope.	Limitation: droughty, slope, wetness.	Limitation: soil blowing, too sandy, wetness.	Limitation: droughty, rooting depth.
408:							
Sims---------------	Slight--------	Severe: ponding.	Severe: slow refill.	Limitation: frost action, percs slowly, ponding.	Limitation: percs slowly, ponding.	Limitation: erodes easily, ponding.	Limitation: erodes easily, percs slowly, wetness.
410B:							
Proper-------------	Severe: seepage.	Severe: piping, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, slope.	Limitation: droughty, slope, wetness.	Limitation: soil blowing, too sandy, wetness.	Limitation: droughty, rooting depth.
Finch--------------	Severe: cemented pan, seepage.	Severe: piping, seepage, wetness.	Severe: no water.	Limitation: cemented pan, cutbanks cave.	Limitation: droughty, wetness.	Limitation: cemented pan, too sandy, wetness.	Limitation: cemented pan, droughty, wetness.
Deford-------------	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, ponding.	Limitation: droughty, ponding.	Limitation: ponding, soil blowing, too sandy.	Limitation: droughty, wetness.
429D:							
Menominee----------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing.	Limitation: droughty, slope.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
441B:							
Morganlake	Severe: seepage.	Moderate: piping, wetness.	Severe: no water.	Limitation: slope, too acid.	Limitation: droughty, slope, wetness.	Limitation: erodes easily, wetness.	Limitation: droughty, erodes easily.
Nester	Moderate: slope.	Slight	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, slope.	Limitation: percs slowly, soil blowing.	Limitation: percs slowly.
441C:							
Morganlake	Severe: seepage.	Moderate: piping, wetness.	Severe: no water.	Limitation: slope, too acid.	Limitation: droughty, slope, wetness.	Limitation: erodes easily, wetness.	Limitation: droughty, erodes easily.
Nester	Moderate: slope.	Slight	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, slope.	Limitation: percs slowly, soil blowing.	Limitation: percs slowly.
442D:							
Menominee	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing.	Limitation: droughty, slope.
Curtisville	Severe: slope.	Slight	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, slope.	Limitation: percs slowly, slope.	Limitation: percs slowly, slope.
473:							
Deford	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, ponding.	Limitation: droughty, ponding.	Limitation: ponding, soil blowing, too sandy.	Limitation: droughty, wetness.
Kinross	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, ponding.	Limitation: ponding.	Limitation: ponding, soil blowing, too sandy.	Limitation: wetness.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
474:							
Histosols	Slight	Severe: excess humus, ponding.	Slight	Limitation: flooding, frost action, ponding.	Limitation: flooding, ponding, soil blowing.	Limitation: ponding, soil blowing.	Limitation: wetness.
Fluvaquents	Slight	Severe: ponding.	Slight	Limitation: flooding, ponding.	Limitation: flooding, ponding.	Limitation: ponding.	Limitation: wetness.
475B:							
Graycalm	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.
Klacking	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
475D:							
Graycalm	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
Klacking	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
475E:							
Graycalm	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
Klacking	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
476B:							
Klacking	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
Perecheney	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: cutbanks cave, slope.	Limitation: droughty, slope, wetness.	Limitation: erodes easily, too sandy, wetness.	Limitation: droughty, erodes easily.
476D:							
Klacking	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: slope, soil blowing, too sandy.	Limitation: droughty, slope.
Perecheney	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Limitation: cutbanks cave, slope.	Limitation: droughty, slope, wetness.	Limitation: erodes easily, slope, too sandy, wetness.	Limitation: droughty, erodes easily, slope.
490:							
Urban land.							
Aquents	Slight	Severe: ponding.	Slight	Limitation: frost action, ponding.	Limitation: ponding.	Limitation: ponding.	Limitation: wetness.
491A:							
Geels	Severe: seepage.	Moderate: hard to pack.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: percs slowly, soil blowing.	Limitation: droughty, rooting depth.
492A:							
Allendale, sandy substratum	Severe: seepage.	Severe: hard to pack, wetness.	Severe: no water.	Limitation: percs slowly, slope.	Limitation: droughty, slope, wetness.	Limitation: percs slowly, soil blowing, wetness.	Limitation: droughty, percs slowly, wetness.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
493A:							
Otisco	Severe: seepage.	Severe: piping, seepage, wetness.	Severe: cutbanks cave.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: soil blowing, too sandy, wetness.	Limitation: droughty, wetness.
495B:							
Gerrish	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: large stones, soil blowing, too sandy.	Limitation: droughty.
495D:							
Gerrish	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: large stones, soil blowing, too sandy.	Limitation: droughty.
495F:							
Gerrish	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: large stones, soil blowing, too sandy.	Limitation: droughty.
496B:							
Gerrish	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: large stones, soil blowing, too sandy.	Limitation: droughty.
Grayling	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.
496D:							
Gerrish	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: large stones, soil blowing, too sandy.	Limitation: droughty.
Grayling	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
496F:							
Gerrish	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: large stones, soil blowing, too sandy.	Limitation: droughty.
Grayling	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, fast intake, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.
497A:							
Debolt	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: deep to water.	Limitation: droughty, slope.	Limitation: soil blowing, too sandy.	Limitation: droughty.
498A:							
Pinewood	Severe: seepage.	Severe: piping, seepage, wetness.	Severe: cutbanks cave, slow refill.	Limitation: cutbanks cave, frost action.	Limitation: droughty, soil blowing, wetness.	Limitation: erodes easily, too sandy, wetness.	Limitation: droughty, erodes easily, wetness.
499:							
Dawson	Severe: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave, slow refill.	Limitation: frost action, ponding, subsides.	Limitation: ponding, rooting depth.	Limitation: ponding.	Limitation: rooting depth, wetness.
Kinross	Severe: seepage.	Severe: piping, ponding, seepage.	Severe: cutbanks cave.	Limitation: cutbanks cave, ponding.	Limitation: ponding.	Limitation: ponding, soil blowing, too sandy.	Limitation: wetness.
500A:							
Flink	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Limitation: cutbanks cave.	Limitation: droughty, wetness.	Limitation: soil blowing, too sandy, wetness.	Limitation: droughty, wetness.

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
501B:							
Kellogg, sandy substratum	Severe: seepage.	Moderate: hard to pack, wetness.	Severe: no water.	Limitation: percs slowly, slope.	Limitation: droughty, slope, wetness.	Limitation: percs slowly, soil blowing, wetness.	Limitation: droughty, percs slowly.
502B:							
Kawkawlin	Slight	Severe: wetness.	Severe: slow refill.	Limitation: frost action, percs slowly.	Limitation: wetness.	Limitation: erodes easily, percs slowly, wetness.	Limitation: erodes easily, percs slowly, wetness.
Sims	Slight	Severe: ponding.	Severe: slow refill.	Limitation: frost action, percs slowly, ponding.	Limitation: percs slowly, ponding.	Limitation: erodes easily, ponding.	Limitation: erodes easily, percs slowly, wetness.

Table 17.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
13:												
Tawas-----------	0-4	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	4-24	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	24-80	Sand, fine sand, gravelly sand.	SP, SM, SP-SM	A-2-4, A-1-b, A-3, A-4	0	0	80-100	70-100	30-80	0-40	0-14	NP
Lupton----------	0-15	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	15-80	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
14:												
Dawson----------	0-5	Peat------------	PT	A-8	0	0	---	---	---	---	---	---
	5-19	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	19-80	Sand, gravelly sand, fine sand.	SM, SC, SP	A-2, A-1, A-3, A-4	0	0	80-100	70-100	15-90	0-45	0-20	NP-10
Loxley----------	0-6	Peat------------	PT	A-8	0	0	---	---	---	---	---	---
	6-80	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
15A:												
Croswell--------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-2	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	97-100	92-100	40-70	5-15	0-14	NP
	2-6	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	97-100	92-100	40-70	5-15	0-14	NP
	6-24	Sand------------	SP, SM, SP-SM	A-1-b, A-3, A-2-4	0	0	97-100	92-100	40-75	3-15	0-14	NP
	24-42	Sand------------	SP, SM, SP-SM	A-1-b, A-2-4, A-3	0	0	97-100	92-100	40-75	3-15	0-14	NP
	42-80	Sand------------	SM, SP, SP-SM	A-1-b, A-3, A-2-4	0	0	97-100	92-100	40-70	3-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
15A:												
Au Gres---------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SM, SP, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
	3-5	Sand------------	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
	5-7	Sand------------	SC-SM, SP-SM, SM, SP	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-75	0-15	0-14	NP
	7-23	Sand------------	SM, SC-SM, SP, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-75	0-15	0-14	NP
	23-33	Sand------------	SM, SC-SM, SP, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-75	0-15	0-14	NP
	33-80	Sand------------	SM, SP-SM, SP	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-70	0-15	0-14	NP
16B:												
Graycalm--------	0-2	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	35-55	0-15	---	NP
	2-27	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
	27-80	Sand, loamy sand	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
17A:												
Croswell--------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-2	Sand------------	SM, SP-SM	A-2-4, A-1-b, A-3	0	0	97-100	92-100	40-70	5-15	0-14	NP
	2-6	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	97-100	92-100	40-70	5-15	0-14	NP
	6-24	Sand------------	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	97-100	92-100	40-75	3-15	0-14	NP
	24-42	Sand------------	SM, SP-SM, SP	A-1-b, A-2-4, A-3	0	0	97-100	92-100	40-75	3-15	0-14	NP
	42-80	Sand------------	SP, SM, SP-SM	A-1-b, A-3, A-2-4	0	0	97-100	92-100	40-70	3-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
18A:												
Au Gres---------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SP, SM, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-70	0-15	0-14	NP
	3-5	Sand------------	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
	5-7	Sand------------	SM, SP-SM, SP, SC-SM	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-75	0-15	0-14	NP
	7-23	Sand------------	SM, SC-SM, SP, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	90-100	35-75	0-15	0-14	NP
	23-33	Sand------------	SM, SC-SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-75	0-15	0-14	NP
	33-80	Sand------------	SM, SP-SM, SP	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-70	0-15	0-14	NP
20B:												
Graycalm--------	0-2	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	35-55	0-15	---	NP
	2-27	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
	27-80	Sand, loamy sand	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
Grayling--------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	3-4	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	4-23	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	23-30	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	30-80	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	40-70	0-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
20D:												
Graycalm--------	0-2	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	80-100	35-55	0-15	---	NP
	2-27	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
	27-80	Sand, loamy sand	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	80-100	30-75	0-30	---	NP
Grayling--------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	3-4	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	4-23	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	23-30	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	30-80	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	40-70	0-15	0-14	NP
20F:												
Graycalm--------	0-2	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	80-100	35-55	0-15	---	NP
	2-27	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
	27-80	Sand, loamy sand	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	80-100	30-75	0-30	---	NP
Grayling--------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	3-4	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	4-23	Sand------------	SP, SM, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	23-30	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	30-80	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	40-70	0-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
23:												
Ausable---------	0-9	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	9-44	Sand, stratified muck.	SM, SP-SM, SP	A-1, A-3, A-2-4	0	0	95-100	92-100	35-75	0-30	0-14	NP
	44-80	Sand------------	SM, SP, SP-SM	A-2-4, A-1, A-3	0	0	95-100	92-100	35-75	0-30	0-14	NP
Bowstring-------	0-34	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	34-38	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	100	100	50-80	5-30	15-20	NP-5
	38-80	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
24A:												
Kinross---------	0-1	Slightly decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-6	Muck------------	PT	A-8	0	0	---	---	---	---	0-0	NP
	6-13	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	13-15	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	15-28	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	28-45	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	45-80	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
Au Gres---------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
	3-5	Sand------------	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
	5-7	Sand------------	SM, SP-SM, SP, SC-SM	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-75	0-15	0-14	NP
	7-23	Sand------------	SC-SM, SP-SM, SM, SP	A-2-4, A-1-b, A-3	0	0	95-100	90-100	35-75	0-15	0-14	NP
	23-33	Sand------------	SM, SP, SC-SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-75	0-15	0-14	NP
	33-80	Sand------------	SM, SP, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-70	0-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
26B:												
Cublake---------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-8	Sand------------	SM, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	95-100	40-70	5-15	0-14	NP
	8-37	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	95-100	40-75	5-15	0-14	NP
	37-53	Sand------------	SM, SP-SM	A-1-b, A-3	0	0	95-100	95-100	40-70	5-15	0-14	NP
	53-80	Stratified very fine sandy loam to loam to silt loam.	CL-ML, CL, SC, SC-SM	A-2-6, A-2-4, A-4, A-6	0	0	95-100	95-100	50-85	25-60	20-35	4-15
34B:												
Kneff-----------	0-8	Very fine sandy loam.	CL, CL-ML	A-4	0	0	95-100	95-100	85-95	50-65	20-30	4-10
	8-14	Silty clay loam, very fine sandy loam, silt loam.	CL, CL-ML	A-4, A-6	0	0	95-100	95-100	85-100	50-95	20-40	4-18
	14-29	Silty clay loam, silt loam.	CL	A-4, A-7, A-6	0	0	95-100	95-100	90-100	80-95	30-45	9-20
	29-61	Stratified silty clay loam to silt loam to silty clay.	CL, CL-ML	A-6, A-4, A-7	0	0	95-100	95-100	85-100	75-95	20-45	4-20
	61-80	Sand, stratified silt loam to silty clay loam.	CL, ML, SM, SC	A-4, A-2-4, A-6	0	0	95-100	95-100	50-100	10-95	0-30	NP-20
35:												
Kinross---------	0-1	Slightly decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-6	Muck------------	PT	A-8	0	0	---	---	---	---	0-0	NP
	6-13	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	13-15	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	15-28	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	28-45	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	45-80	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
47D:												
Graycalm--------	0-2	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	35-55	0-15	---	NP
	2-27	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
	27-80	Sand, loamy sand	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	80-100	30-75	0-30	---	NP
47F:												
Graycalm--------	0-2	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	35-55	0-15	---	NP
	2-27	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
	27-80	Sand, loamy sand	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
50B:												
Au Gres---------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SM, SP, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
	3-5	Sand------------	SM, SP-SM, SP	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
	5-7	Sand------------	SP, SM, SC-SM, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-75	0-15	0-14	NP
	7-23	Sand------------	SM, SC-SM, SP, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	90-100	35-75	0-15	0-14	NP
	23-33	Sand------------	SC-SM, SP-SM, SM, SP	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-75	0-15	0-14	NP
	33-80	Sand------------	SM, SP, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-70	0-15	0-14	NP
Kinross---------	0-1	Slightly decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-6	Muck------------	PT	A-8	0	0	---	---	---	---	0-0	NP
	6-13	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	13-15	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	15-28	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	28-45	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	45-80	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
50B:												
Croswell--------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-2	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	97-100	92-100	40-70	5-15	0-14	NP
	2-6	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	97-100	92-100	40-70	5-15	0-14	NP
	6-24	Sand------------	SM, SP, SP-SM	A-1-b, A-3, A-2-4	0	0	97-100	92-100	40-75	3-15	0-14	NP
	24-42	Sand------------	SP, SM, SP-SM	A-2-4, A-1-b, A-3	0	0	97-100	92-100	40-75	3-15	0-14	NP
	42-80	Sand------------	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	97-100	92-100	40-70	3-15	0-14	NP
51:												
Tawas-----------	0-4	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	4-24	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	24-80	Sand, fine sand, gravelly sand.	SP, SM, SP-SM	A-2-4, A-3, A-1-b, A-4	0	0	80-100	70-100	30-80	0-40	0-14	NP
Leafriver-------	0-10	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	10-12	Loamy sand-------	SM	A-2-4, A-4	0	0	100	95-100	55-80	15-50	15-20	NP-4
	12-80	Sand------------	SM, SP, SP-SM	A-2-4, A-3, A-2, A-1	0	0	95-100	80-100	45-70	3-35	0-14	NP
57B:												
Kawkawlin-------	0-3	Loam------------	CL-ML, CL, ML	A-4, A-6	0	0-5	95-100	90-100	70-95	50-75	20-40	2-15
	3-5	Loam------------	CL, ML, CL-ML	A-4, A-6	0	0-5	95-100	90-100	70-95	50-75	20-40	2-15
	5-9	Clay loam, loam--	CH, CL	A-7	0	0-5	95-100	90-100	75-100	55-95	40-55	20-30
	9-32	Clay loam--------	CH, CL	A-7	0	0-5	95-100	90-100	75-100	55-95	40-55	20-30
	32-80	Clay loam--------	CL	A-6, A-7	0	0-5	95-100	90-100	75-100	50-95	35-50	15-25
58A:												
Wakeley---------	0-4	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	4-38	Sand------------	SM, SC-SM, SP, SP-SM	A-2-4, A-3	0	0	95-100	92-100	35-75	0-30	15-25	NP-7
	38-80	Silty clay loam--	CH, CL	A-7	0	0	95-100	92-100	85-100	75-95	40-65	20-40

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
58A:												
Allendale-------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-7	Sand-------------	SP-SM, SM, SW-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	45-80	5-15	0-14	NP
	7-26	Sand-------------	SP-SM, SM, SW-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	45-80	5-15	0-14	NP
	26-37	Sand, loamy sand	SM, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	90-100	45-80	5-20	0-14	NP
	37-39	Loamy sand, sandy loam.	SM, SP-SM	A-2-4, A-1-b, A-3, A-4	0	0	95-100	90-100	45-80	5-40	0-14	NP
	39-47	Silty clay, clay	CH, MH	A-7	0	0	95-100	90-100	90-100	75-95	50-70	20-40
	47-80	Silty clay, clay	CH, MH	A-7	0	0	95-100	90-100	90-100	75-95	50-70	20-40
67A:												
Bowers----------	0-3	Fine sandy loam--	CL	A-4, A-6	0	0	99-100	99-100	85-100	60-90	25-40	7-16
	3-16	Sandy loam-------	CL	A-6, A-7	0	0	99-100	99-100	90-100	70-80	35-50	15-25
	16-20	Sandy loam, silty clay loam.	CL	A-6, A-7	0	0	99-100	99-100	90-100	70-80	35-50	15-25
	20-43	Stratified silty clay loam to very fine sandy loam.	CL	A-7	0	0	99-100	99-100	90-100	70-95	40-50	20-25
	43-52	Stratified silty clay loam to clay loam to very fine sandy loam.	CL	A-6, A-7	0	0	99-100	99-100	90-100	70-95	35-50	15-25
	52-80	Stratified silty clay loam to silt loam to very fine sandy loam.	CL	A-6, A-7	0	0	99-100	99-100	90-100	70-95	35-50	15-25

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
67A:												
Deerheart-------	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	80-100	65-90	25-35	5-15
	6-27	Silty clay loam, clay loam.	CL	A-6, A-7	0	0	95-100	90-100	80-100	65-95	35-50	15-25
	27-43	Silty clay loam, stratified very fine sandy loam to silt to silt loam.	CL	A-6, A-7	0	0	95-100	90-100	80-100	65-95	35-50	15-25
	43-80	Stratified silty clay loam to very fine sandy loam to silt loam.	CL, CL-ML	A-4, A-6, A-7	0	0	95-100	90-100	75-100	50-95	25-50	5-25
75B:												
Rubicon---------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	92-100	35-70	0-15	0-14	NP
	3-7	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	92-100	35-70	0-15	0-14	NP
	7-21	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	92-100	35-70	0-15	0-14	NP
	21-31	Sand------------	SP, SM, SP-SM	A-1, A-2, A-3	0	0	95-100	92-100	35-70	0-15	0-14	NP
	31-80	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	92-100	30-70	0-15	0-14	NP
75D:												
Rubicon---------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	92-100	35-70	0-15	0-14	NP
	3-7	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	92-100	35-70	0-15	0-14	NP
	7-21	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	92-100	35-70	0-15	0-14	NP
	21-31	Sand------------	SM, SP-SM, SP	A-1, A-2, A-3	0	0	95-100	92-100	35-70	0-15	0-14	NP
	31-80	Sand------------	SP-SM, SP, SM	A-1, A-2, A-3	0	0	95-100	92-100	30-70	0-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
78. Pits												
81B: Grayling--------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand-------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	3-4	Sand-------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	4-23	Sand-------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	23-30	Sand-------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	30-80	Sand-------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	40-70	0-15	0-14	NP
81D: Grayling--------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand-------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	3-4	Sand-------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	4-23	Sand-------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	23-30	Sand-------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	30-80	Sand-------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	40-70	0-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
81F:												
Grayling--------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	3-4	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	4-23	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	23-30	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	30-80	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	40-70	0-15	0-14	NP
82B:												
Udorthents------	0-80	Variable---------	---	---	---	---	---	---	---	---	---	---
83B:												
Udipsamments----	0-80	Sand, loamy sand	SM, SP, SP-SM	A-1, A-3, A-2	0	0	85-100	75-100	30-75	0-25	0-14	NP
83F:												
Udipsamments----	0-80	Sand, loamy sand	SP, SM, SP-SM	A-2, A-1, A-3	0	0	85-100	75-100	30-75	0-25	0-14	NP
86:												
Histosols-------	0-24	Muck------------	PT	A-8	---	---	---	---	---	---	---	---
	24-80	Variable---------	---	---	---	---	---	---	---	---	---	---
Aquents---------	0-80	Variable---------	---	---	---	---	---	---	---	---	---	---
87:												
Ausable---------	0-9	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	9-44	Sand, stratified muck.	SM, SP-SM, SP	A-1, A-2-4, A-3	0	0	95-100	92-100	35-75	0-30	0-14	NP
	44-80	Sand------------	SP, SM, SP-SM	A-1, A-2-4, A-3	0	0	95-100	92-100	35-75	0-30	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
90B:												
Chinwhisker-----	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand------------	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
	3-7	Sand------------	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
	7-23	Sand------------	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-70	0-25	0-14	NP
	23-72	Sand------------	SM, SP, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-70	0-25	0-14	NP
	72-80	Sand, loamy sand, sandy loam.	SM, SP-SM, SP	A-2-4, A-1-b, A-3	0	0	95-100	90-100	35-75	0-25	0-14	NP
102D:												
Curtisville-----	0-4	Loam------------	ML, CL, CL-ML	A-4, A-6	0	0	90-100	85-99	65-99	50-90	15-30	2-15
	4-9	Loam, clay loam--	CL, SC	A-2, A-4, A-6	0	0	90-100	85-99	45-99	20-90	25-39	7-18
	9-16	Clay loam, sandy loam.	CL, SC	A-2, A-6, A-4	0	0	90-100	85-99	45-99	20-90	25-39	7-18
	16-31	Clay loam, clay--	CH, CL	A-7	0	0	90-100	85-99	75-99	55-95	44-53	21-28
	31-33	Clay loam--------	CL	A-7	0	0	90-100	85-99	75-99	50-95	39-48	18-25
	33-80	Clay loam--------	CL	A-7	0	0	90-100	85-99	75-99	50-95	39-48	18-25
103B:												
Nester----------	0-7	Sandy loam-------	ML, SM, SC	A-1-b, A-2-4, A-4	0	0	95-100	92-100	45-85	20-55	15-30	NP-10
	7-9	Sandy loam, loam	ML, SC, SM	A-1-b, A-4, A-2-4	0	0	95-100	92-100	45-85	20-55	15-30	NP-10
	9-12	Clay loam, sandy loam, loam.	CL, SM, ML	A-2-4, A-1-b, A-4	0	0	95-100	92-100	45-100	20-90	15-35	NP-10
	12-33	Clay loam--------	CH, CL	A-7	0	0	95-100	92-100	75-100	55-95	40-55	20-30
	33-80	Clay loam--------	CL	A-7	0	0	95-100	92-100	70-100	50-95	40-50	15-25
103C:												
Nester----------	0-7	Sandy loam-------	ML, SC, SM	A-1-b, A-2-4, A-4	0	0	95-100	92-100	45-85	20-55	15-30	NP-10
	7-9	Sandy loam, loam	ML, SM, SC	A-1-b, A-2-4, A-4	0	0	95-100	92-100	45-85	20-55	15-30	NP-10
	9-12	Clay loam, sandy loam, loam.	CL, ML, SM	A-1-b, A-4, A-2-4	0	0	95-100	92-100	45-100	20-90	15-35	NP-10
	12-33	Clay loam--------	CH, CL	A-7	0	0	95-100	92-100	75-100	55-95	40-55	20-30
	33-80	Clay loam--------	CL	A-7	0	0	95-100	92-100	70-100	50-95	40-50	15-25

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
114A:												
Ingalls---------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-2	Sand-------------	SM, SP-SM	A-1, A-2, A-3	0	0-8	90-100	85-100	40-80	5-35	0-14	NP
	2-7	Sand-------------	SM, SP-SM	A-1, A-3, A-2	0	0-8	90-100	85-100	40-80	5-35	0-14	NP
	7-11	Sand-------------	SM, SP-SM	A-2, A-1, A-3	0	0-8	90-100	85-100	40-80	5-35	0-14	NP
	11-26	Sand, loamy sand, fine sand.	SM, SP-SM	A-1, A-2, A-3	0	0-8	90-100	85-100	40-80	5-35	0-14	NP
	26-33	Sand, loamy sand, fine sand.	SM, SP-SM	A-1, A-3, A-2	0	0-8	90-100	85-100	40-80	5-35	0-14	NP
	33-80	Stratified loamy fine sand to silt.	CL-ML, SC, CL, SC-SM	A-4, A-6	0	0	95-100	90-100	65-100	45-95	20-35	4-15
120B:												
Morganlake------	0-2	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	2-13	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	13-25	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	25-37	Clay loam--------	CL	A-6, A-7	0	0	95-100	92-100	65-95	55-75	25-45	10-20
	37-80	Clay loam, silty clay loam.	CL	A-6, A-7	0	0	95-100	92-100	65-95	55-75	25-45	10-20
120C:												
Morganlake------	0-2	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	2-13	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	13-25	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	25-37	Clay loam--------	CL	A-6, A-7	0	0	95-100	92-100	65-95	55-75	25-45	10-20
	37-80	Clay loam, silty clay loam.	CL	A-6, A-7	0	0	95-100	92-100	65-95	55-75	25-45	10-20

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
123D:												
Klacking--------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SM, SP-SM	A-1, A-2	0	0	90-100	75-100	35-75	0-15	0-14	NP
	3-25	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	90-100	75-100	35-75	0-30	0-14	NP
	25-37	Sand, loamy sand	SP, SM, SP-SM	A-1, A-3, A-2	0	0	90-100	75-100	35-75	0-30	0-14	NP
	37-42	Sand, loamy sand, sandy loam.	SP, SM, SP-SM, SC-SM	A-2, A-3, A-1, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	42-54	Sandy loam, sand, loamy sand.	SP, SM, SP-SM, SC-SM	A-2, A-3, A-1, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	54-80	Sand, loamy sand	SM, SP, SP-SM	A-2, A-3, A-1	0	0	90-100	75-100	35-70	0-40	0-25	NP
144B:												
Perecheney------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	85-100	40-70	5-15	0-14	NP
	3-5	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	85-100	40-70	5-15	0-14	NP
	5-28	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	85-100	40-70	5-15	0-14	NP
	28-34	Loam, clay loam, loamy sand.	CL-ML, CL, SC	A-4, A-6	0	0	95-100	85-100	55-95	40-80	25-40	7-20
	34-71	Loam, clay loam--	CL, CL-ML, SC	A-4, A-6	0	0	95-100	85-100	55-95	40-80	25-40	7-20
	71-80	Sand, loamy sand, sandy loam.	SC-SM, SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	85-100	40-75	5-30	15-25	NP-7

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
144C:												
Perecheney------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand------------	SM, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	85-100	40-70	5-15	0-14	NP
	3-5	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	85-100	40-70	5-15	0-14	NP
	5-28	Sand------------	SM, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	85-100	40-70	5-15	0-14	NP
	28-34	Loam, clay loam, loamy sand.	CL, CL-ML, SC	A-4, A-6	0	0	95-100	85-100	55-95	40-80	25-40	7-20
	34-71	Loam, clay loam--	CL, CL-ML, SC	A-4, A-6	0	0	95-100	85-100	55-95	40-80	25-40	7-20
	71-80	Sand, loamy sand, sandy loam.	SC-SM, SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	85-100	40-75	5-30	15-25	NP-7
159A:												
Finch-----------	0-3	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	3-5	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	95-100	40-70	5-15	0-14	NP
	5-16	Sand------------	SM, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	95-100	40-70	5-15	0-14	NP
	16-20	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	20-22	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	22-35	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	35-45	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	45-80	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
307B:												
Klacking--------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SM, SP-SM	A-1, A-2	0	0	90-100	75-100	35-75	0-15	0-14	NP
	3-25	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	90-100	75-100	35-75	0-30	0-14	NP
	25-37	Sand, loamy sand	SM, SP-SM, SP	A-1, A-3, A-2	0	0	90-100	75-100	35-75	0-30	0-14	NP
	37-42	Sand, loamy sand, sandy loam.	SP-SM, SP, SC-SM, SM	A-1, A-2, A-4, A-3	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	42-54	Sandy loam, sand, loamy sand.	SP, SM, SP-SM, SC-SM	A-2, A-3, A-1, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	54-80	Sand, loamy sand	SP-SM, SM, SP	A-2, A-3, A-1	0	0	90-100	75-100	35-70	0-40	0-25	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
307E:												
Klacking	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand	SM, SP-SM	A-1, A-2	0	0	90-100	75-100	35-75	0-15	0-14	NP
	3-25	Sand	SM, SP, SP-SM	A-1, A-2, A-3	0	0	90-100	75-100	35-75	0-30	0-14	NP
	25-37	Sand, loamy sand	SM, SP-SM, SP	A-1, A-3, A-2	0	0	90-100	75-100	35-75	0-30	0-14	NP
	37-42	Sand, loamy sand, sandy loam.	SP, SM, SP-SM, SC-SM	A-1, A-2, A-4, A-3	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	42-54	Sandy loam, sand, loamy sand.	SP, SP-SM, SM, SC-SM	A-2, A-3, A-1, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	54-80	Sand, loamy sand	SP-SM, SP, SM	A-1, A-2, A-3	0	0	90-100	75-100	35-70	0-40	0-25	NP
360:												
Wakeley	0-4	Muck	PT	A-8	0	0	---	---	---	---	---	---
	4-38	Sand	SP, SP-SM, SM, SC-SM	A-2-4, A-3	0	0	95-100	92-100	35-75	0-30	15-25	NP-7
	38-80	Silty clay loam	CH, CL	A-7	0	0	95-100	92-100	85-100	75-95	40-65	20-40
368A:												
Au Gres	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand	SP, SM, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
	3-5	Sand	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
	5-7	Sand	SM, SP-SM, SP, SC-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-75	0-15	0-14	NP
	7-23	Sand	SM, SC-SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-75	0-15	0-14	NP
	23-33	Sand	SM, SP, SC-SM, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	90-100	35-75	0-15	0-14	NP
	33-80	Sand	SM, SP, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-70	0-15	0-14	NP
Deford	0-2	Muck	PT	A-8	0	0	---	---	---	---	---	---
	2-80	Sand, fine sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	50-80	0-35	15-20	NP-4
369:												
Deford	0-2	Muck	PT	A-8	0	0	---	---	---	---	---	---
	2-80	Sand, fine sand	SM, SP, SP-SM	A-2-4, A-3	0	0	95-100	92-100	50-80	0-35	15-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
380. Access denied												
382B:												
Proper----------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-4	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	4-11	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	11-12	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	12-47	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	47-80	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
408:												
Sims------------	0-9	Loam------------	CL, CL-ML	A-4, A-6	0	0	95-100	95-100	70-95	50-75	25-40	5-15
	9-36	Clay loam, silty clay loam, silty clay.	CH, CL	A-7	0	0	95-100	95-100	75-95	55-90	40-55	20-30
	36-51	Clay loam--------	CH, CL	A-7	0	0	95-100	95-100	75-95	55-90	40-55	20-30
	51-80	Clay loam--------	CL	A-7	0	0	95-100	95-100	75-95	55-90	40-50	20-25
410B:												
Proper----------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-4	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	4-11	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	11-12	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	12-47	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	47-80	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
Finch-----------	0-3	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	3-5	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	95-100	40-70	5-15	0-14	NP
	5-16	Sand------------	SM, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	95-100	40-70	5-15	0-14	NP
	16-20	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	20-22	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	22-35	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	35-45	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	45-80	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
Deford----------	0-2	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	2-80	Sand, fine sand--	SM, SP-SM, SP	A-2-4, A-3	0	0	95-100	92-100	50-80	0-35	15-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
429D:												
Menominee-------	0-4	Sand-------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	50-80	5-30	0-10	NP
	4-7	Sand-------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	50-80	5-30	0-10	NP
	7-23	Sand, fine sand--	SP, SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	92-100	30-75	0-15	0-10	NP
	23-39	Clay loam, sandy loam.	CL, CL-ML	A-4, A-6	0	0	95-100	92-100	45-95	20-90	10-40	5-20
	39-59	Clay loam, silty clay loam.	CL	A-6	0	0	95-100	92-100	80-95	60-90	25-40	10-20
	59-80	Loam, clay loam, silty clay loam.	CL, SC-SM, CL-ML, SC	A-4, A-2, A-6	0	0	95-100	92-100	80-95	20-80	25-40	5-20
441B:												
Morganlake------	0-2	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	2-13	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	13-25	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	25-37	Clay loam--------	CL	A-6, A-7	0	0	95-100	92-100	65-95	55-75	25-45	10-20
	37-80	Clay loam, silty clay loam.	CL	A-6, A-7	0	0	95-100	92-100	65-95	55-75	25-45	10-20
Nester----------	0-7	Sandy loam-------	ML, SC, SM	A-2-4, A-1-b, A-4	0	0	95-100	92-100	45-85	20-55	15-30	NP-10
	7-9	Sandy loam, loam	ML, SC, SM	A-1-b, A-2-4, A-4	0	0	95-100	92-100	45-85	20-55	15-30	NP-10
	9-12	Clay loam, sandy loam, loam.	CL, ML, SM	A-1-b, A-2-4, A-4	0	0	95-100	92-100	45-100	20-90	15-35	NP-10
	12-33	Clay loam--------	CH, CL	A-7	0	0	95-100	92-100	75-100	55-95	40-55	20-30
	33-80	Clay loam--------	CL	A-7	0	0	95-100	92-100	70-100	50-95	40-50	15-25
441C:												
Morganlake------	0-2	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	2-13	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	13-25	Sand-------------	SM, SP-SM	A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP
	25-37	Clay loam--------	CL	A-6, A-7	0	0	95-100	92-100	65-95	55-75	25-45	10-20
	37-80	Clay loam, silty clay loam.	CL	A-6, A-7	0	0	95-100	92-100	65-95	55-75	25-45	10-20
Nester----------	0-7	Sandy loam-------	SC, ML, SM	A-2-4, A-1-b, A-4	0	0	95-100	92-100	45-85	20-55	15-30	NP-10
	7-9	Sandy loam, loam	ML, SC, SM	A-1-b, A-2-4, A-4	0	0	95-100	92-100	45-85	20-55	15-30	NP-10
	9-12	Clay loam, sandy loam, loam.	CL, ML, SM	A-1-b, A-4, A-2-4	0	0	95-100	92-100	45-100	20-90	15-35	NP-10
	12-33	Clay loam--------	CH, CL	A-7	0	0	95-100	92-100	75-100	55-95	40-55	20-30
	33-80	Clay loam--------	CL	A-7	0	0	95-100	92-100	70-100	50-95	40-50	15-25

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
442D:												
Menominee-------	0-4	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	50-80	5-30	0-10	NP
	4-7	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	92-100	50-80	5-30	0-10	NP
	7-23	Sand, fine sand--	SM, SP, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	92-100	30-75	0-15	0-10	NP
	23-39	Clay loam, sandy loam.	CL, CL-ML	A-4, A-6	0	0	95-100	92-100	45-95	20-90	10-40	5-20
	39-59	Clay loam, silty clay loam.	CL	A-6	0	0	95-100	92-100	80-95	60-90	25-40	10-20
	59-80	Loam, clay loam, silty clay loam.	CL-ML, CL, SC, SC-SM	A-2, A-4, A-6	0	0	95-100	92-100	80-95	20-80	25-40	5-20
Curtisville-----	0-4	Loam------------	ML, CL, CL-ML	A-4, A-6	0	0	90-100	85-99	65-99	50-90	15-30	2-15
	4-9	Loam, clay loam--	CL, SC	A-2, A-4, A-6	0	0	90-100	85-99	45-99	20-90	25-39	7-18
	9-16	Clay loam, sandy loam.	CL, SC	A-2, A-6, A-4	0	0	90-100	85-99	45-99	20-90	25-39	7-18
	16-31	Clay loam, clay--	CH, CL	A-7	0	0	90-100	85-99	75-99	55-95	44-53	21-28
	31-33	Clay loam--------	CL	A-7	0	0	90-100	85-99	75-99	50-95	39-48	18-25
	33-80	Clay loam--------	CL	A-7	0	0	90-100	85-99	75-99	50-95	39-48	18-25
473:												
Deford----------	0-2	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	2-80	Sand, fine sand--	SM, SP, SP-SM	A-2-4, A-3	0	0	95-100	92-100	50-80	0-35	15-20	NP-4
Kinross---------	0-1	Slightly decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-6	Muck------------	PT	A-8	0	0	---	---	---	---	0-0	NP
	6-13	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	13-15	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	15-28	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	28-45	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	45-80	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
474:												
Histosols-------	0-24	Muck------------	PT	A-8	0	0	---	---	---	---	---	---
	24-80	Variable---------	---	---	---	---	---	---	---	---	---	---
Fluvaquents-----	0-80	Variable---------	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
475B:												
Graycalm--------	0-2	Sand-------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	35-55	0-15	---	NP
	2-27	Sand-------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	80-100	30-75	0-30	---	NP
	27-80	Sand, loamy sand	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
Klacking--------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand-------------	SM, SP-SM	A-1, A-2	0	0	90-100	75-100	35-75	0-15	0-14	NP
	3-25	Sand-------------	SM, SP-SM, SP	A-1, A-2, A-3	0	0	90-100	75-100	35-75	0-30	0-14	NP
	25-37	Sand, loamy sand	SM, SP, SP-SM	A-1, A-3, A-2	0	0	90-100	75-100	35-75	0-30	0-14	NP
	37-42	Sand, loamy sand, sandy loam.	SP-SM, SC-SM, SP, SM	A-2, A-1, A-3, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	42-54	Sandy loam, sand, loamy sand.	SP-SM, SC-SM, SP, SM	A-2, A-3, A-1, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	54-80	Sand, loamy sand	SP, SM, SP-SM	A-2, A-3, A-1	0	0	90-100	75-100	35-70	0-40	0-25	NP
475D:												
Graycalm--------	0-2	Sand-------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	80-100	35-55	0-15	---	NP
	2-27	Sand-------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	80-100	30-75	0-30	---	NP
	27-80	Sand, loamy sand	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
Klacking--------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand-------------	SM, SP-SM	A-1, A-2	0	0	90-100	75-100	35-75	0-15	0-14	NP
	3-25	Sand-------------	SP, SM, SP-SM	A-1, A-2, A-3	0	0	90-100	75-100	35-75	0-30	0-14	NP
	25-37	Sand, loamy sand	SM, SP, SP-SM	A-1, A-3, A-2	0	0	90-100	75-100	35-75	0-30	0-14	NP
	37-42	Sand, loamy sand, sandy loam.	SP-SM, SC-SM, SP, SM	A-2, A-1, A-3, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	42-54	Sandy loam, sand, loamy sand.	SP-SM, SP, SC-SM, SM	A-2, A-3, A-1, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	54-80	Sand, loamy sand	SM, SP, SP-SM	A-2, A-3, A-1	0	0	90-100	75-100	35-70	0-40	0-25	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
475E:												
Graycalm--------	0-2	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	80-100	35-55	0-15	---	NP
	2-27	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
	27-80	Sand, loamy sand	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	80-100	30-75	0-30	---	NP
Klacking--------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SM, SP-SM	A-1, A-2	0	0	90-100	75-100	35-75	0-15	0-14	NP
	3-25	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	90-100	75-100	35-75	0-30	0-14	NP
	25-37	Sand, loamy sand	SM, SP, SP-SM	A-1, A-3, A-2	0	0	90-100	75-100	35-75	0-30	0-14	NP
	37-42	Sand, loamy sand, sandy loam.	SP, SP-SM, SM, SC-SM	A-2, A-1, A-3, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	42-54	Sandy loam, sand, loamy sand.	SP-SM, SC-SM, SP, SM	A-2, A-3, A-1, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	54-80	Sand, loamy sand	SM, SP-SM, SP	A-2, A-3, A-1	0	0	90-100	75-100	35-70	0-40	0-25	NP
476B:												
Klacking--------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SM, SP-SM	A-1, A-2	0	0	90-100	75-100	35-75	0-15	0-14	NP
	3-25	Sand------------	SP, SM, SP-SM	A-1, A-2, A-3	0	0	90-100	75-100	35-75	0-30	0-14	NP
	25-37	Sand, loamy sand	SM, SP, SP-SM	A-1, A-3, A-2	0	0	90-100	75-100	35-75	0-30	0-14	NP
	37-42	Sand, loamy sand, sandy loam.	SP-SM, SC-SM, SP, SM	A-2, A-3, A-1, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	42-54	Sandy loam, sand, loamy sand.	SP, SP-SM, SM, SC-SM	A-2, A-3, A-1, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	54-80	Sand, loamy sand	SM, SP-SM, SP	A-2, A-3, A-1	0	0	90-100	75-100	35-70	0-40	0-25	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
476B:												
Perecheney------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand------------	SM, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	85-100	40-70	5-15	0-14	NP
	3-5	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	85-100	40-70	5-15	0-14	NP
	5-28	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	85-100	40-70	5-15	0-14	NP
	28-34	Loam, clay loam, loamy sand.	CL-ML, CL, SC	A-4, A-6	0	0	95-100	85-100	55-95	40-80	25-40	7-20
	34-71	Loam, clay loam--	CL, CL-ML, SC	A-4, A-6	0	0	95-100	85-100	55-95	40-80	25-40	7-20
	71-80	Sand, loamy sand, sandy loam.	SC-SM, SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	85-100	40-75	5-30	15-25	NP-7
476D:												
Klacking--------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SM, SP-SM	A-1, A-2	0	0	90-100	75-100	35-75	0-15	0-14	NP
	3-25	Sand------------	SP, SM, SP-SM	A-1, A-2, A-3	0	0	90-100	75-100	35-75	0-30	0-14	NP
	25-37	Sand, loamy sand	SM, SP, SP-SM	A-1, A-3, A-2	0	0	90-100	75-100	35-75	0-30	0-14	NP
	37-42	Sand, loamy sand, sandy loam.	SP-SM, SC-SM, SP, SM	A-2, A-3, A-1, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	42-54	Sandy loam, sand, loamy sand.	SP, SP-SM, SM, SC-SM	A-2, A-3, A-1, A-4	0	0	90-100	75-100	35-75	0-50	3-25	NP-7
	54-80	Sand, loamy sand	SM, SP, SP-SM	A-2, A-3, A-1	0	0	90-100	75-100	35-70	0-40	0-25	NP
Perecheney------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand------------	SM, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	85-100	40-70	5-15	0-14	NP
	3-5	Sand------------	SM, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	85-100	40-70	5-15	0-14	NP
	5-28	Sand------------	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	85-100	40-70	5-15	0-14	NP
	28-34	Loam, clay loam, loamy sand.	CL-ML, CL, SC	A-4, A-6	0	0	95-100	85-100	55-95	40-80	25-40	7-20
	34-71	Loam, clay loam--	CL, CL-ML, SC	A-4, A-6	0	0	95-100	85-100	55-95	40-80	25-40	7-20
	71-80	Sand, loamy sand, sandy loam.	SC-SM, SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	85-100	40-75	5-30	15-25	NP-7

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
490:												
Urban land.												
Aquents	0-80	Variable	---	---	---	---	---	---	---	---	---	---
491A:												
Geels	0-2	Sand	SM, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	95-100	35-70	5-15	12-20	NP-4
	2-29	Sand	SM, SP-SM	A-2-4, A-3, A-1-b	0	0	95-100	95-100	35-70	5-15	12-20	NP-4
	29-49	Sand	SM, SP-SM	A-3, A-2-4, A-1-b	0	0	95-100	95-100	35-70	5-15	12-20	NP-4
	49-55	Clay, clay loam, silty clay loam, silty clay.	CH, CL	A-7	0	0	95-100	95-100	90-100	80-95	40-60	20-35
	55-71	Silty clay	CH, CL	A-7	0	0	95-100	95-100	90-100	80-95	40-60	20-35
	71-80	Clay loam	CL	A-7, A-6	0	0	95-100	95-100	80-95	65-75	35-50	15-25
492A:												
Allendale, sandy substratum	0-3	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	3-8	Sand	SM, SP-SM	A-3, A-2, A-2-4	0	0	95-100	90-100	35-70	5-15	12-20	NP-4
	8-10	Sand	SM, SP-SM	A-2, A-2-4, A-3	0	0	95-100	90-100	35-70	5-15	12-20	NP-4
	10-31	Sand	SM, SP-SM	A-2, A-2-4, A-3	0	0	95-100	90-100	35-70	5-15	12-20	NP-4
	31-37	Sand, loamy sand, sandy loam.	SP-SM, SM	A-2, A-2-4, A-3	0	0	95-100	90-100	45-75	5-30	12-28	NP-9
	37-58	Clay	CL, CH	A-7	0	0	95-100	90-100	80-100	65-95	45-70	25-40
	58-76	Clay loam, silty clay loam.	CL, CH	A-7	0	0	95-100	90-100	80-100	65-95	45-70	25-40
	76-80	Sand	SM, SP-SM	A-3, A-2-4, A-2	0	0	95-100	90-100	35-70	5-15	12-21	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
493A:												
Otisco----------	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SC-SM, SM, SP-SM	A-1-b, A-2, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP-5
	3-12	Sand------------	SC-SM, SM, SP-SM	A-2, A-1-b, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP-5
	12-15	Sand------------	SC-SM, SM, SP-SM, SP	A-1-b, A-3, A-2-4	0	0	95-100	92-100	35-75	0-15	0-14	NP-5
	15-20	Sand, loamy sand	SM, SC-SM, SP, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	92-100	35-75	0-15	0-14	NP-5
	20-27	Sand------------	SC-SM, SM, SP-SM	A-1-b, A-2, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP-5
	27-36	Sand, loamy sand	SC-SM, SM, SP-SM	A-1-b, A-3, A-2	0	0	95-100	92-100	45-75	5-30	0-14	NP-5
	36-55	Loamy sand, sandy loam, sand.	SC-SM, SM, SP-SM	A-1-b, A-2, A-3	0	0	95-100	92-100	45-75	5-30	0-14	NP-5
	55-80	Sand, loamy sand	SM, SP-SM	A-2, A-3	0	0	95-100	92-100	35-70	5-15	0-14	NP-5
495B:												
Gerrish---------	0-1	Sand------------	SM, SP, SP-SM	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	1-3	Sand------------	SM, SP-SM, SP	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	3-26	Gravelly sand, very gravelly sand, cobbly sand.	SP-SM, SP, GP-GM, GP	A-2, A-1	0	0-20	55-95	50-75	15-70	0-10	0-14	NP
	26-80	Sand, loamy sand	SP, SM, SP-SM	A-1, A-2-4, A-2	0	0-5	95-100	80-100	35-55	0-15	0-14	NP
495D:												
Gerrish---------	0-1	Sand------------	SM, SP-SM, SP	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	1-3	Sand------------	SM, SP, SP-SM	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	3-26	Gravelly sand, very gravelly sand, cobbly sand.	SP-SM, GP-GM, SP, GP	A-2, A-1	0	0-20	55-95	50-75	15-70	0-10	0-14	NP
	26-80	Sand, loamy sand	SM, SP, SP-SM	A-1, A-2, A-2-4	0	0-5	95-100	80-100	35-55	0-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
495F:												
Gerrish---------	0-1	Sand-------------	SM, SP, SP-SM	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	1-3	Sand-------------	SM, SP, SP-SM	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	3-26	Gravelly sand, very gravelly sand, cobbly sand.	SP, GP, SP-SM, GP-GM	A-2, A-1	0	0-20	55-95	50-75	15-70	0-10	0-14	NP
	26-80	Sand, loamy sand	SM, SP-SM, SP	A-1, A-2-4, A-2	0	0-5	95-100	80-100	35-55	0-15	0-14	NP
496B:												
Gerrish---------	0-1	Sand-------------	SM, SP, SP-SM	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	1-3	Sand-------------	SM, SP-SM, SP	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	3-26	Gravelly sand, very gravelly sand, cobbly sand.	SP-SM, SP, GP-GM, GP	A-2, A-1	0	0-20	55-95	50-75	15-70	0-10	0-14	NP
	26-80	Sand, loamy sand	SM, SP, SP-SM	A-1, A-2-4, A-2	0	0-5	95-100	80-100	35-55	0-15	0-14	NP
Grayling--------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand-------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	3-4	Sand-------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	4-23	Sand-------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	23-30	Sand-------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	30-80	Sand-------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	40-70	0-15	0-14	NP
496D:												
Gerrish---------	0-1	Sand-------------	SM, SP-SM, SP	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	1-3	Sand-------------	SP, SM, SP-SM	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	3-26	Gravelly sand, very gravelly sand, cobbly sand.	SP-SM, GP-GM, SP, GP	A-2, A-1	0	0-20	55-95	50-75	15-70	0-10	0-14	NP
	26-80	Sand, loamy sand	SM, SP, SP-SM	A-1, A-2, A-2-4	0	0-5	95-100	80-100	35-55	0-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
496D:												
Grayling--------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	3-4	Sand------------	SM, SP, SP-SM	A-2, A-1, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	4-23	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	23-30	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	30-80	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	40-70	0-15	0-14	NP
496F:												
Gerrish---------	0-1	Sand------------	SM, SP, SP-SM	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	1-3	Sand------------	SM, SP, SP-SM	A-1, A-2-4	0	0	95-100	85-100	35-55	0-15	0-14	NP
	3-26	Gravelly sand, very gravelly sand, cobbly sand.	SP, GP, SP-SM, GP-GM	A-2, A-1	0	0-20	55-95	50-75	15-70	0-10	0-14	NP
	26-80	Sand, loamy sand	SM, SP-SM, SP	A-2, A-1, A-2-4	0	0-5	95-100	80-100	35-55	0-15	0-14	NP
Grayling--------	0-2	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-3	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	3-4	Sand------------	SM, SP, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	4-23	Sand------------	SM, SP-SM, SP	A-1, A-3, A-2	0	0	95-100	90-100	45-70	3-15	0-14	NP
	23-30	Sand------------	SP, SM, SP-SM	A-2, A-1, A-3	0	0	95-100	90-100	45-70	3-15	0-14	NP
	30-80	Sand------------	SP, SM, SP-SM	A-1, A-2, A-3	0	0	95-100	90-100	40-70	0-15	0-14	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
497A:												
Debolt----------	0-3	Sandy loam-------	SC, SC-SM	A-2	0	0	95-100	90-99	55-70	15-30	23-30	6-11
	3-7	Sandy loam-------	SC, SC-SM	A-2	0	0	95-100	90-99	55-70	15-30	23-30	6-11
	7-10	Clay loam, sandy loam.	CL	A-7	0	0	95-100	90-99	80-99	65-95	23-45	8-20
	10-28	Clay, silty clay, clay loam.			0	0	95-100	90-99	60-99	40-60	45-55	20-30
	28-33	Sandy clay loam, clay loam.			0	0	95-100	90-99	60-99	40-60	20-40	12-20
	33-80	Sand, loamy sand	SC-SM, SM, SP-SM	A-2	0	0	90-100	85-100	35-70	5-15	0-14	NP
498A:												
Pinewood--------	0-8	Sandy loam-------	SC-SM, SC	A-2-4, A-4	0	0	95-100	92-100	55-70	25-40	20-30	5-10
	8-14	Clay, sandy loam	CL, CH	A-6, A-7-6	0	0	95-100	92-100	80-100	65-95	35-60	15-30
	14-41	Clay, silty clay	CL, CH	A-6, A-7-6	0	0	95-100	92-100	85-100	75-95	40-60	20-30
	41-45	Clay, silty clay	CL, CH	A-6, A-7-6	0	0	95-100	92-100	85-100	75-95	40-60	20-30
	45-80	Sand-------------	SM, SP-SM	A-2, A-3	0	0	90-100	85-100	35-70	5-15	0-14	NP-4
499:												
Dawson----------	0-5	Peat-------------	PT	A-8	0	0	---	---	---	---	---	---
	5-19	Muck-------------	PT	A-8	0	0	---	---	---	---	---	---
	19-80	Sand, gravelly sand, fine sand.	SC, SM, SP	A-1, A-2, A-4, A-3	0	0	80-100	70-100	15-90	0-45	0-20	NP-10
Kinross---------	0-1	Slightly decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-6	Muck-------------	PT	A-8	0	0	---	---	---	---	0-0	NP
	6-13	Sand-------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	13-15	Sand-------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	15-28	Sand-------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	28-45	Sand-------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
	45-80	Sand-------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	35-70	5-15	0-14	NP
500A:												
Flink-----------	0-2	Highly decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	2-7	Sand-------------	SM, SP-SM	A-3, A-1-b	0	0	92-100	90-100	25-70	5-25	0-14	NP
	7-28	Sand-------------	SM, SP-SM	A-1-b, A-3	0	0	92-100	90-100	25-70	5-35	0-14	NP
	28-43	Sand-------------	SM, SP-SM	A-1-b, A-3	0	0	92-100	90-100	25-70	5-35	0-14	NP
	43-55	Sand-------------	SM, SP-SM	A-1-b, A-3	0	0	92-100	90-100	25-70	5-35	0-14	NP
	55-80	Stratified loam to clay loam.	CL	A-4, A-6	0	0	92-100	90-100	85-100	60-90	25-40	8-20

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
501B:												
Kellogg, sandy substratum-----	0-1	Moderately decomposed plant material.	PT	A-8	0	0	---	---	---	---	---	---
	1-3	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	40-70	5-15	12-20	NP-4
	3-7	Sand------------	SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	40-70	5-15	12-20	NP-4
	7-19	Sand------------	SM, SP-SM	A-2-4, A-1, A-3	0	0	95-100	90-100	35-70	5-15	12-20	NP-4
	19-32	Coarse sand, sand.	SM, SP-SM	A-1, A-2-4, A-3	0	0	95-100	90-100	35-70	5-15	12-20	NP-4
	32-38	Clay loam, loamy sand.	CH, CL	A-7-6, A-7, A-6	0	0	95-100	90-100	80-100	65-95	40-65	20-40
	38-65	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-7-6, A-6	0	0	95-100	90-100	80-100	65-95	40-65	20-40
	65-80	Loamy very fine sand, very fine sand, loamy sand.	SP-SM, SM	A-2-4, A-3	0	0	95-100	90-100	45-95	5-60	15-25	NP-7
502B:												
Kawkawlin-------	0-3	Loam------------	CL-ML, CL, ML	A-4, A-6	0	0-5	95-100	90-100	70-95	50-75	20-40	2-15
	3-5	Loam------------	CL, CL-ML, ML	A-4, A-6	0	0-5	95-100	90-100	70-95	50-75	20-40	2-15
	5-9	Clay loam, loam--	CH, CL	A-7	0	0-5	95-100	90-100	75-100	55-95	40-55	20-30
	9-32	Clay loam--------	CH, CL	A-7	0	0-5	95-100	90-100	75-100	55-95	40-55	20-30
	32-80	Clay loam--------	CL	A-6, A-7	0	0-5	95-100	90-100	75-100	50-95	35-50	15-25
Sims------------	0-9	Loam------------	CL, CL-ML	A-4, A-6	0	0	95-100	95-100	70-95	50-75	25-40	5-15
	9-36	Clay loam, silty clay loam, silty clay.	CH, CL	A-7	0	0	95-100	95-100	75-95	55-90	40-55	20-30
	36-51	Clay loam--------	CH, CL	A-7	0	0	95-100	95-100	75-95	55-90	40-55	20-30
	51-80	Clay loam--------	CL	A-7	0	0	95-100	95-100	75-95	55-90	40-50	20-25

Table 18.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
13:												
Tawas-----------	0-4	0-0	0.30-0.55	0.20-6.0	0.35-0.45	---	40-60	---	---	2	2	134
	4-24	0-0	0.30-0.55	0.20-6.0	0.24-0.45	---	40-60	---	---			
	24-80	0-10	1.40-1.65	6.0 -20.0	0.03-0.10	0.0-2.9	0.0-0.5	.10	.15			
Lupton----------	0-15	0-0	0.10-0.35	0.20-6.0	0.35-0.45	---	70-90	---	---	3	2	134
	15-80	0-0	0.10-0.35	0.20-6.0	0.35-0.45	---	70-90	---	---			
14:												
Dawson----------	0-5	0-0	0.15-0.30	6.0 -20.0	0.55-0.65	---	65-85	---	---	2	7	38
	5-19	0-0	0.15-0.40	0.20-6.0	0.35-0.45	---	65-85	---	---			
	19-80	0-10	1.55-1.75	6.0 -20.0	0.03-0.10	0.0-2.9	0.0-0.5	.10	.15			
Loxley----------	0-6	0-0	0.30-0.40	6.0 -20.0	0.35-0.65	---	70-90	---	---	3	7	38
	6-80	0-0	0.10-0.35	0.20-6.0	0.35-0.45	---	70-90	---	---			
15A:												
Croswell--------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-2	0-10	1.30-1.55	6.0 -20.0	0.06-0.09	0.0-2.9	1.0-3.0	.15	.15			
	2-6	0-10	1.30-1.55	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-2.0	.15	.15			
	6-24	0-10	1.40-1.60	6.0 -20.0	0.06-0.10	0.0-2.9	0.5-3.0	.15	.15			
	24-42	0-10	1.40-1.60	6.0 -20.0	0.06-0.10	0.0-2.9	0.0-0.5	.15	.15			
	42-80	0-10	1.50-1.65	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
Au Gres---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-8	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	2.0-4.0	.15	.15			
	3-5	0-8	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	0.5-2.0	.15	.15			
	5-7	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	2.0-5.0	.15	.15			
	7-23	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-3.0	.15	.15			
	23-33	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	0.0-0.5	.15	.15			
	33-80	0-8	1.50-1.70	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
16B:												
Graycalm--------	0-2	0-10	1.30-1.55	6.0 -20.0	0.04-0.10	0.0-2.9	0.5-2.0	.15	.15	5	1	220
	2-27	0-10	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	27-80	0-15	1.50-1.65	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
17A:												
Croswell--------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-2	0-10	1.30-1.55	6.0 -20.0	0.06-0.09	0.0-2.9	1.0-3.0	.15	.15			
	2-6	0-10	1.30-1.55	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-2.0	.15	.15			
	6-24	0-10	1.40-1.60	6.0 -20.0	0.06-0.10	0.0-2.9	0.5-3.0	.15	.15			
	24-42	0-10	1.40-1.60	6.0 -20.0	0.06-0.10	0.0-2.9	0.0-0.5	.15	.15			
	42-80	0-10	1.50-1.65	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
18A:												
Au Gres---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-8	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	2.0-4.0	.15	.15			
	3-5	0-8	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	0.5-2.0	.15	.15			
	5-7	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	2.0-5.0	.15	.15			
	7-23	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-3.0	.15	.15			
	23-33	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	0.0-0.5	.15	.15			
	33-80	0-8	1.50-1.70	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
20B:												
Graycalm--------	0-2	0-10	1.30-1.55	6.0 -20.0	0.04-0.10	0.0-2.9	0.5-2.0	.15	.15	5	1	220
	2-27	0-10	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	27-80	0-15	1.50-1.65	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
20B:												
Grayling--------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-3	0-10	1.30-1.65	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15			
	3-4	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	4-23	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-30	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	30-80	0-10	1.45-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
20D:												
Graycalm--------	0-2	0-10	1.30-1.55	6.0 -20.0	0.04-0.10	0.0-2.9	0.5-2.0	.15	.15	5	1	220
	2-27	0-10	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	27-80	0-15	1.50-1.65	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
Grayling--------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-3	0-10	1.30-1.65	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15			
	3-4	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	4-23	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-30	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	30-80	0-10	1.45-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
20F:												
Graycalm--------	0-2	0-10	1.30-1.55	6.0 -20.0	0.04-0.10	0.0-2.9	0.5-2.0	.15	.15	5	1	220
	2-27	0-10	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	27-80	0-15	1.50-1.65	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
Grayling--------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-3	0-10	1.30-1.65	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15			
	3-4	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	4-23	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-30	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	30-80	0-10	1.45-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
23:												
Ausable---------	0-9	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	3	2	134
	9-44	0-10	1.30-1.60	6.0 -20.0	0.04-0.08	0.0-2.9	5.0-50	.15	.15			
	44-80	0-10	1.30-1.60	6.0 -20.0	0.04-0.08	0.0-2.9	0.5-1.0	.15	.15			
Bowstring-------	0-34	0-0	0.15-0.30	0.20-6.0	0.35-0.45	---	40-90	---	---	3	2	134
	34-38	0-5	1.40-1.60	6.0 -20.0	0.08-0.14	0.0-2.9	0.5-1.0	---	---			
	38-80	0-0	0.15-0.30	0.20-6.0	0.35-0.45	---	40-90	---	---			
24A:												
Kinross---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	2	134
	1-6	0-0	0.10-0.35	2.0 -6.0	0.35-0.45	---	20-70	---	---			
	6-13	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.5-2.0	.15	.15			
	13-15	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	2.0-5.0	.15	.15			
	15-28	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.5-3.0	.15	.15			
	28-45	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
	45-80	0-10	1.40-1.70	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Au Gres---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-8	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	2.0-4.0	.15	.15			
	3-5	0-8	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	0.5-2.0	.15	.15			
	5-7	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	2.0-5.0	.15	.15			
	7-23	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-3.0	.15	.15			
	23-33	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	0.0-0.5	.15	.15			
	33-80	0-8	1.50-1.70	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
26B:												
Cublake---------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	4	1	220
	2-8	0-10	1.30-1.55	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-2.0	.15	.15			
	8-37	0-10	1.30-1.55	6.0 -20.0	0.06-0.10	0.0-2.9	0.5-3.0	.15	.15			
	37-53	0-10	1.30-1.55	6.0 -20.0	0.04-0.11	0.0-2.9	0.0-0.5	.15	.15			
	53-80	10-25	1.40-1.80	0.20-0.6	0.12-0.18	0.0-2.9	0.0-0.5	.32	.32			
34B:												
Kneff-----------	0-8	10-18	1.30-1.60	0.6 -2.0	0.20-0.22	0.0-2.9	1.0-3.0	.37	.37	5	3	86
	8-14	10-30	1.35-1.55	0.20-2.0	0.17-0.22	0.0-2.9	0.0-0.5	.43	.43			
	14-29	18-35	1.35-1.55	0.20-0.6	0.18-0.22	0.0-2.9	0.0-0.5	.43	.43			
	29-61	10-35	1.30-1.65	0.20-0.6	0.17-0.20	0.0-2.9	0.0-0.5	.43	.43			
	61-80	5-35	1.30-1.65	0.20-20.0	0.05-0.20	0.0-2.9	0.0-0.5	.17	.17			
35:												
Kinross---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	2	134
	1-6	0-0	0.10-0.35	2.0 -6.0	0.35-0.45	---	20-70	---	---			
	6-13	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.5-2.0	.15	.15			
	13-15	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	2.0-5.0	.15	.15			
	15-28	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.5-3.0	.15	.15			
	28-45	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
	45-80	0-10	1.40-1.70	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
47D:												
Graycalm--------	0-2	0-10	1.30-1.55	6.0 -20.0	0.04-0.10	0.0-2.9	0.5-2.0	.15	.15	5	1	220
	2-27	0-10	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	27-80	0-15	1.50-1.65	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
47F:												
Graycalm--------	0-2	0-10	1.30-1.55	6.0 -20.0	0.04-0.10	0.0-2.9	0.5-2.0	.15	.15	5	1	220
	2-27	0-10	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	27-80	0-15	1.50-1.65	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
50B:												
Au Gres---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-8	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	2.0-4.0	.15	.15			
	3-5	0-8	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	0.5-2.0	.15	.15			
	5-7	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	2.0-5.0	.15	.15			
	7-23	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-3.0	.15	.15			
	23-33	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	0.0-0.5	.15	.15			
	33-80	0-8	1.50-1.70	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
Kinross---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	2	134
	1-6	0-0	0.10-0.35	2.0 -6.0	0.35-0.45	---	20-70	---	---			
	6-13	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.5-2.0	.15	.15			
	13-15	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	2.0-5.0	.15	.15			
	15-28	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.5-3.0	.15	.15			
	28-45	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
	45-80	0-10	1.40-1.70	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Croswell--------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-2	0-10	1.30-1.55	6.0 -20.0	0.06-0.09	0.0-2.9	1.0-3.0	.15	.15			
	2-6	0-10	1.30-1.55	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-2.0	.15	.15			
	6-24	0-10	1.40-1.60	6.0 -20.0	0.06-0.10	0.0-2.9	0.5-3.0	.15	.15			
	24-42	0-10	1.40-1.60	6.0 -20.0	0.06-0.10	0.0-2.9	0.0-0.5	.15	.15			
	42-80	0-10	1.50-1.65	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
51:												
Tawas-----------	0-4	---	0.30-0.55	0.20-6.0	0.35-0.45	---	40-60	---	---	2	2	134
	4-24	---	0.30-0.55	0.20-6.0	0.24-0.45	---	40-60	---	---			
	24-80	0-10	1.40-1.65	6.0 -20.0	0.03-0.10	0.0-2.9	0.0-0.5	.10	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
51:												
Leafriver-------	0-10	---	0.30-0.40	0.6 -6.0	0.35-0.50	---	40-60	---	---	3	2	134
	10-12	3-15	1.40-1.65	2.0 -20.0	0.08-0.14	0.0-2.9	2.0-5.0	.17	.17			
	12-80	0-10	1.50-1.65	6.0 -20.0	0.03-0.08	0.0-2.9	0.0-1.0	.17	.17			
57B:												
Kawkawlin-------	0-3	8-27	1.45-1.60	0.6 -2.0	0.20-0.22	0.0-2.9	2.0-4.0	.37	.37	4	5	56
	3-5	8-27	1.45-1.60	0.6 -2.0	0.20-0.22	0.0-2.9	0.5-2.0	.37	.37			
	5-9	18-45	1.45-1.60	0.06-0.20	0.10-0.20	3.0-5.9	0.0-0.5	.32	.37			
	9-32	35-45	1.45-1.60	0.06-0.20	0.10-0.20	3.0-5.9	0.0-0.5	.32	.37			
	32-80	30-40	1.50-1.60	0.06-0.20	0.13-0.20	3.0-5.9	0.0-0.5	.32	.32			
58A:												
Wakeley---------	0-4	---	0.30-0.40	6.0 -20.0	0.35-0.45	---	40-60	---	---	4	2	134
	4-38	0-15	1.45-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	38-80	35-40	1.50-1.70	0.06-0.20	0.08-0.12	6.0-8.9	0.0-0.5	.32	.32			
Allendale-------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	4	1	220
	2-7	0-10	1.25-1.40	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-2.0	.15	.15			
	7-26	0-10	1.25-1.40	6.0 -20.0	0.07-0.09	0.0-2.9	2.0-4.0	.15	.15			
	26-37	0-15	1.35-1.45	6.0 -20.0	0.06-0.10	0.0-2.9	0.0-1.0	.17	.17			
	37-39	0-15	1.35-1.45	6.0 -20.0	0.06-0.10	0.0-2.9	0.0-1.0	.17	.17			
	39-47	40-60	1.45-1.70	0.00-0.06	0.08-0.12	6.0-8.9	0.0-0.5	.32	.32			
	47-80	40-60	1.45-1.70	0.00-0.06	0.08-0.12	6.0-8.9	0.0-0.5	.32	.32			
67A:												
Bowers----------	0-3	10-20	1.40-1.70	0.6 -2.0	0.20-0.22	0.0-2.9	1.0-3.0	.32	.32	4	3	86
	3-16	10-20	1.45-1.60	0.20-0.6	0.12-0.17	3.0-5.9	0.0-0.5	.32	.32			
	16-20	10-40	1.45-1.60	0.20-0.6	0.12-0.17	3.0-5.9	0.0-0.5	.32	.32			
	20-43	18-40	1.45-1.60	0.06-0.20	0.18-0.20	3.0-5.9	0.0-0.5	.43	.32			
	43-52	18-40	1.50-1.65	0.06-0.6	0.18-0.22	3.0-5.9	0.0-0.5	.43	.32			
	52-80	18-40	1.50-1.65	0.06-0.6	0.18-0.22	3.0-5.9	0.0-0.5	.43	.32			
Deerheart-------	0-6	12-27	1.10-1.60	0.6 -2.0	0.22-0.24	0.0-2.9	2.0-5.0	.37	.37	4	6	48
	6-27	27-35	1.40-1.70	0.06-0.20	0.15-0.20	3.0-5.9	0.0-0.5	.43	.43			
	27-43	10-35	1.40-1.70	0.06-0.20	0.15-0.20	3.0-5.9	0.0-0.5	.43	.43			
	43-80	10-40	1.50-1.75	0.06-0.20	0.08-0.22	3.0-5.9	0.0-0.5	.43	.43			
75B:												
Rubicon---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-5	1.25-1.45	6.0 -20.0	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15			
	3-7	0-10	1.30-1.60	6.0 -20.0	0.04-0.08	0.0-2.9	0.5-2.0	.15	.15			
	7-21	0-10	1.30-1.60	6.0 -20.0	0.04-0.08	0.0-2.9	0.5-3.0	.15	.15			
	21-31	0-10	1.30-1.60	6.0 -20.0	0.04-0.08	0.0-2.9	0.0-0.5	.15	.15			
	31-80	0-5	1.40-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
75D:												
Rubicon---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-5	1.25-1.45	6.0 -20.0	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15			
	3-7	0-10	1.30-1.60	6.0 -20.0	0.04-0.08	0.0-2.9	0.5-2.0	.15	.15			
	7-21	0-10	1.30-1.60	6.0 -20.0	0.04-0.08	0.0-2.9	0.5-3.0	.15	.15			
	21-31	0-10	1.30-1.60	6.0 -20.0	0.04-0.08	0.0-2.9	0.0-0.5	.15	.15			
	31-80	0-5	1.40-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
78.												
Pits												

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
81B:												
Grayling--------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-3	0-10	1.30-1.65	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15			
	3-4	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	4-23	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-30	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	30-80	0-10	1.45-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
81D:												
Grayling--------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-3	0-10	1.30-1.65	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15			
	3-4	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	4-23	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-30	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	30-80	0-10	1.45-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
81F:												
Grayling--------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-3	0-10	1.30-1.65	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15			
	3-4	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	4-23	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-30	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	30-80	0-10	1.45-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
82B:												
Udorthents------	0-80	0-45	---	---	---	---	---	---	---	5	3	86
83B:												
Udipsamments----	0-80	0-10	1.35-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	0.5-1.0	.15	.15	5	1	220
83F:												
Udipsamments----	0-80	0-10	1.35-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	0.5-1.0	.15	.15	5	1	220
86:												
Histosols-------	0-24	---	---	---	---	---	50-70	---	---	3	8	134
	24-80	---	---	---	---	---	---	---	---			
Aquents---------	0-80	---	---	---	---	---	---	---	---	5	8	220
87:												
Ausable---------	0-9	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	3	2	134
	9-44	0-10	1.30-1.60	6.0 -20.0	0.04-0.08	0.0-2.9	5.0-50	.15	.15			
	44-80	0-10	1.30-1.60	6.0 -20.0	0.04-0.08	0.0-2.9	0.5-1.0	.15	.15			
90B:												
Chinwhisker-----	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-3	0-8	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	2.0-4.0	.15	.15			
	3-7	0-5	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-2.0	.15	.15			
	7-23	0-10	1.30-1.55	6.0 -20.0	0.06-0.08	0.0-2.9	0.5-3.0	.15	.15			
	23-72	0-10	1.30-1.55	6.0 -20.0	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15			
	72-80	3-10	1.50-1.65	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
102D:												
Curtisville-----	0-4	7-27	1.25-1.60	0.6 -2.0	0.20-0.24	0.0-2.9	1.0-3.0	.32	.32	4	5	56
	4-9	15-30	1.40-1.70	0.6 -2.0	0.15-0.19	0.0-2.9	0.0-0.5	.32	.32			
	9-16	15-30	1.40-1.70	0.6 -2.0	0.15-0.19	0.0-2.9	0.0-0.5	.32	.32			
	16-31	35-45	1.40-1.70	0.06-0.20	0.09-0.19	3.0-5.9	0.0-0.5	.32	.32			
	31-33	30-40	1.45-1.65	0.06-0.20	0.10-0.17	3.0-5.9	0.0-0.5	.32	.32			
	33-80	30-40	1.45-1.65	0.06-0.20	0.10-0.17	3.0-5.9	0.0-0.5	.32	.32			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
103B:												
Nester----------	0-7	5-20	1.25-1.60	2.0 -6.0	0.13-0.15	0.0-2.9	1.0-3.0	.24	.24	4	3	86
	7-9	5-20	1.25-1.60	2.0 -6.0	0.13-0.15	0.0-2.9	1.0-3.0	.24	.24			
	9-12	5-40	1.40-1.60	0.6 -2.0	0.15-0.22	0.0-2.9	0.0-0.5	.32	.32			
	12-33	35-40	1.40-1.65	0.06-0.20	0.08-0.17	3.0-5.9	0.0-0.5	.32	.32			
	33-80	30-40	1.55-1.70	0.06-0.20	0.10-0.17	3.0-5.9	0.0-0.5	.32	.32			
103C:												
Nester----------	0-7	5-20	1.25-1.60	2.0 -6.0	0.13-0.15	0.0-2.9	1.0-3.0	.24	.24	4	3	86
	7-9	5-20	1.25-1.60	2.0 -6.0	0.13-0.15	0.0-2.9	1.0-3.0	.24	.24			
	9-12	5-40	1.40-1.60	0.6 -2.0	0.15-0.22	0.0-2.9	0.0-0.5	.32	.32			
	12-33	35-40	1.40-1.65	0.06-0.20	0.08-0.17	3.0-5.9	0.0-0.5	.32	.32			
	33-80	30-40	1.55-1.70	0.06-0.20	0.10-0.17	3.0-5.9	0.0-0.5	.32	.32			
114A:												
Ingalls---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	4	1	220
	1-2	0-5	1.25-1.40	6.0 -20.0	0.05-0.10	0.0-2.9	0.5-3.0	.15	.15			
	2-7	0-5	1.25-1.40	6.0 -20.0	0.05-0.10	0.0-2.9	0.5-2.0	.15	.15			
	7-11	3-10	1.35-1.45	6.0 -20.0	0.05-0.10	0.0-2.9	2.0-5.0	.15	.15			
	11-26	3-15	1.35-1.45	6.0 -20.0	0.05-0.10	0.0-2.9	0.5-3.0	.17	.17			
	26-33	3-15	1.35-1.45	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.17	.17			
	33-80	2-20	1.45-1.80	0.20-0.6	0.09-0.22	0.0-2.9	0.0-0.5	.43	.43			
120B:												
Morganlake------	0-2	1-10	1.30-1.55	6.0 -20.0	0.07-0.12	0.0-2.9	2.0-4.0	.15	.15	4	1	220
	2-13	1-10	1.40-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	13-25	1-10	1.40-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.5-3.0	.15	.15			
	25-37	27-35	1.45-1.70	0.20-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.43			
	37-80	27-35	1.45-1.70	0.20-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.43			
120C:												
Morganlake------	0-2	1-10	1.30-1.55	6.0 -20.0	0.07-0.12	0.0-2.9	2.0-4.0	.15	.15	4	1	220
	2-13	1-10	1.40-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	13-25	1-10	1.40-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.5-3.0	.15	.15			
	25-37	27-35	1.45-1.70	0.20-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.43			
	37-80	27-35	1.45-1.70	0.20-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.43			
123D:												
Klacking--------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-10	1.35-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	1.0-2.0	.15	.15			
	3-25	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	25-37	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	37-42	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	42-54	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	54-80	0-10	1.50-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
144B:												
Perecheney------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	4	1	220
	2-3	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-5.0	.15	.15			
	3-5	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-2.0	.15	.15			
	5-28	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-1.0	.15	.15			
	28-34	5-35	1.35-1.55	0.20-2.0	0.15-0.20	0.0-2.9	0.0-0.5	.32	.32			
	34-71	18-35	1.35-1.55	0.20-2.0	0.15-0.20	0.0-2.9	0.0-0.5	.32	.32			
	71-80	0-15	1.40-1.65	2.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.17	.17			
144C:												
Perecheney------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	4	1	220
	2-3	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-5.0	.15	.15			
	3-5	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-2.0	.15	.15			
	5-28	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-1.0	.15	.15			
	28-34	5-35	1.35-1.55	0.20-2.0	0.15-0.20	0.0-2.9	0.0-0.5	.32	.32			
	34-71	18-35	1.35-1.55	0.20-2.0	0.15-0.20	0.0-2.9	0.0-0.5	.32	.32			
	71-80	0-15	1.40-1.65	2.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.17	.17			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
159A:												
Finch-----------	0-3	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	2	1	220
	3-5	0-10	1.30-1.55	6.0 -20.0	0.06-0.09	0.0-2.9	2.0-5.0	.15	.15			
	5-16	0-10	1.30-1.55	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-2.0	.15	.15			
	16-20	5-10	1.75-2.05	0.6 -6.0	0.02-0.04	0.0-2.9	2.0-5.0	.15	.15			
	20-22	5-10	1.75-2.05	0.6 -6.0	0.02-0.04	0.0-2.9	0.5-3.0	.15	.15			
	22-35	5-10	1.75-2.05	6.0 -20.0	0.02-0.04	0.0-2.9	0.5-3.0	.15	.15			
	35-45	5-10	1.75-2.05	6.0 -20.0	0.02-0.04	0.0-2.9	0.0-0.5	.15	.15			
	45-80	0-10	1.40-1.55	6.0 -20.0	0.02-0.04	0.0-2.9	0.0-0.5	.15	.15			
307B:												
Klacking--------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-10	1.35-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	1.0-2.0	.15	.15			
	3-25	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	25-37	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	37-42	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	42-54	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	54-80	0-10	1.50-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
307E:												
Klacking--------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-10	1.35-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	1.0-2.0	.15	.15			
	3-25	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	25-37	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	37-42	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	42-54	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	54-80	0-10	1.50-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
360:												
Wakeley---------	0-4	---	0.30-0.40	6.0 -20.0	0.35-0.45	---	40-60	---	---	4	1	220
	4-38	0-15	1.45-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	38-80	35-40	1.50-1.70	0.00-0.20	0.08-0.12	6.0-8.9	0.0-0.5	.32	.32			
368A:												
Au Gres---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-8	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	2.0-4.0	.15	.15			
	3-5	0-8	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	0.5-2.0	.15	.15			
	5-7	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	2.0-5.0	.15	.15			
	7-23	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-3.0	.15	.15			
	23-33	0-8	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	0.0-0.5	.15	.15			
	33-80	0-8	1.50-1.70	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
Deford----------	0-2	---	0.30-0.50	0.20-6.0	0.35-0.45	---	40-60	---	---	5	2	134
	2-80	0-12	1.40-1.60	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
369:												
Deford----------	0-2	---	0.30-0.50	0.20-6.0	0.35-0.45	---	40-60	---	---	5	2	134
	2-80	0-12	1.40-1.60	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
380.												
Access denied												
382B:												
Proper----------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-4	0-5	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	1.0-4.0	.15	.15			
	4-11	0-5	1.30-1.55	6.0 -20.0	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15			
	11-12	0-5	1.65-2.00	6.0 -20.0	0.03-0.04	0.0-2.9	2.0-5.0	.15	.15			
	12-47	0-5	1.40-1.60	0.6 -6.0	0.05-0.07	0.0-2.9	0.0-3.0	.15	.15			
	47-80	0-5	1.50-1.60	2.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
408:												
Sims------------	0-9	18-27	1.35-1.55	0.6 -2.0	0.20-0.22	0.0-2.9	3.0-10	.24	.24	4	5	56
	9-36	35-45	1.40-1.70	0.06-0.20	0.12-0.20	3.0-5.9	0.0-0.5	.37	.37			
	36-51	35-40	1.40-1.70	0.06-0.20	0.12-0.20	3.0-5.9	0.0-0.5	.37	.37			
	51-80	35-40	1.40-1.65	0.06-0.20	0.10-0.18	3.0-5.9	0.0-0.5	.37	.37			
410B:												
Proper----------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-4	0-5	1.30-1.55	6.0 -20.0	0.07-0.10	0.0-2.9	1.0-4.0	.15	.15			
	4-11	0-5	1.30-1.55	6.0 -20.0	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15			
	11-12	0-5	1.65-2.00	6.0 -20.0	0.03-0.04	0.0-2.9	2.0-5.0	.15	.15			
	12-47	0-5	1.40-1.60	0.6 -6.0	0.05-0.07	0.0-2.9	0.0-3.0	.15	.15			
	47-80	0-5	1.50-1.60	2.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
Finch-----------	0-3	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	2	1	220
	3-5	0-10	1.30-1.55	6.0 -20.0	0.06-0.09	0.0-2.9	2.0-5.0	.15	.15			
	5-16	0-10	1.30-1.55	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-2.0	.15	.15			
	16-20	5-10	1.75-2.05	0.6 -6.0	0.02-0.04	0.0-2.9	2.0-5.0	.15	.15			
	20-22	5-10	1.75-2.05	0.6 -6.0	0.02-0.04	0.0-2.9	0.5-3.0	.15	.15			
	22-35	5-10	1.75-2.05	6.0 -20.0	0.02-0.04	0.0-2.9	0.5-3.0	.15	.15			
	35-45	5-10	1.75-2.05	6.0 -20.0	0.02-0.04	0.0-2.9	0.0-0.5	.15	.15			
	45-80	0-10	1.40-1.55	6.0 -20.0	0.02-0.04	0.0-2.9	0.0-0.5	.15	.15			
Deford----------	0-2	---	0.30-0.50	0.20-6.0	0.35-0.45	---	40-60	---	---	5	2	134
	2-80	0-12	1.40-1.60	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
429D:												
Menominee-------	0-4	0-10	1.35-1.55	6.0 -20.0	0.08-0.10	0.0-2.9	2.0-4.0	.15	.15	4	1	220
	4-7	0-10	1.35-1.55	6.0 -20.0	0.08-0.10	0.0-2.9	0.5-2.0	.15	.15			
	7-23	5-15	1.45-1.70	6.0 -20.0	0.04-0.10	0.0-2.9	0.5-3.0	.15	.17			
	23-39	10-35	1.45-1.70	0.20-0.6	0.14-0.18	3.0-5.9	0.0-0.5	.28	.32			
	39-59	18-35	1.45-1.70	0.20-0.6	0.14-0.18	3.0-5.9	0.0-0.5	.28	.32			
	59-80	12-35	1.45-1.75	0.20-0.6	0.13-0.18	3.0-5.9	0.0-0.5	.32	.37			
441B:												
Morganlake------	0-2	1-10	1.30-1.55	6.0 -20.0	0.07-0.12	0.0-2.9	2.0-4.0	.15	.15	4	1	220
	2-13	1-10	1.40-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	13-25	1-10	1.40-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.5-3.0	.15	.15			
	25-37	27-35	1.45-1.70	0.20-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.43			
	37-80	27-35	1.45-1.70	0.20-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.43			
Nester----------	0-7	5-20	1.25-1.60	2.0 -6.0	0.13-0.15	0.0-2.9	1.0-3.0	.24	.24	4	3	86
	7-9	5-20	1.25-1.60	2.0 -6.0	0.13-0.15	0.0-2.9	1.0-3.0	.24	.24			
	9-12	5-40	1.40-1.60	0.6 -2.0	0.15-0.22	0.0-2.9	0.0-0.5	.32	.32			
	12-33	35-40	1.40-1.65	0.06-0.20	0.08-0.17	3.0-5.9	0.0-0.5	.32	.32			
	33-80	30-40	1.55-1.70	0.06-0.20	0.10-0.17	3.0-5.9	0.0-0.5	.32	.32			
441C:												
Morganlake------	0-2	1-10	1.30-1.55	6.0 -20.0	0.07-0.12	0.0-2.9	2.0-4.0	.15	.15	4	1	220
	2-13	1-10	1.40-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	13-25	1-10	1.40-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.5-3.0	.15	.15			
	25-37	27-35	1.45-1.70	0.20-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.43			
	37-80	27-35	1.45-1.70	0.20-0.6	0.14-0.16	3.0-5.9	0.0-0.5	.37	.43			
Nester----------	0-7	5-20	1.25-1.60	2.0 -6.0	0.13-0.15	0.0-2.9	1.0-3.0	.24	.24	4	3	86
	7-9	5-20	1.25-1.60	2.0 -6.0	0.13-0.15	0.0-2.9	1.0-3.0	.24	.24			
	9-12	5-40	1.40-1.60	0.6 -2.0	0.15-0.22	0.0-2.9	0.0-0.5	.32	.32			
	12-33	35-40	1.40-1.65	0.06-0.20	0.08-0.17	3.0-5.9	0.0-0.5	.32	.32			
	33-80	30-40	1.55-1.70	0.06-0.20	0.10-0.17	3.0-5.9	0.0-0.5	.32	.32			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
442D:												
Menominee-------	0-4	0-10	1.35-1.55	6.0 -20.0	0.08-0.10	0.0-2.9	2.0-4.0	.15	.15	4	1	220
	4-7	0-10	1.35-1.55	6.0 -20.0	0.08-0.10	0.0-2.9	0.5-2.0	.15	.15			
	7-23	5-15	1.45-1.70	6.0 -20.0	0.04-0.10	0.0-2.9	0.5-3.0	.15	.17			
	23-39	10-35	1.45-1.70	0.20-0.6	0.14-0.18	3.0-5.9	0.0-0.5	.28	.32			
	39-59	18-35	1.45-1.70	0.20-0.6	0.14-0.18	3.0-5.9	0.0-0.5	.28	.32			
	59-80	12-35	1.45-1.75	0.20-0.6	0.13-0.18	3.0-5.9	0.0-0.5	.32	.37			
Curtisville-----	0-4	7-27	1.25-1.60	0.6 -2.0	0.20-0.24	0.0-2.9	1.0-3.0	.32	.32	4	3	86
	4-9	15-30	1.40-1.70	0.6 -2.0	0.15-0.19	0.0-2.9	0.0-0.5	.32	.32			
	9-16	15-30	1.40-1.70	0.6 -2.0	0.15-0.19	0.0-2.9	0.0-0.5	.32	.32			
	16-31	35-45	1.40-1.70	0.06-0.20	0.09-0.19	3.0-5.9	0.0-0.5	.32	.32			
	31-33	30-40	1.45-1.65	0.06-0.20	0.10-0.17	3.0-5.9	0.0-0.5	.32	.32			
	33-80	30-40	1.45-1.65	0.06-0.20	0.10-0.17	3.0-5.9	0.0-0.5	.32	.32			
473:												
Deford----------	0-2	---	0.30-0.50	0.20-6.0	0.35-0.45	---	40-60	---	---	5	2	134
	2-80	0-12	1.40-1.60	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
Kinross---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	2	134
	1-6	0-0	0.10-0.35	2.0 -6.0	0.35-0.45	---	20-70	---	---			
	6-13	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.5-2.0	.15	.15			
	13-15	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	2.0-5.0	.15	.15			
	15-28	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.5-3.0	.15	.15			
	28-45	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
	45-80	0-10	1.40-1.70	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
474:												
Histosols-------	0-24	---	---	---	---	---	50-70	---	---	3	2	134
	24-80	---	---	---	---	---	---	---	---			
Fluvaquents-----	0-80	---	---	---	---	---	---	---	---	5	---	---
475B:												
Graycalm--------	0-2	0-10	1.30-1.55	6.0 -20.0	0.04-0.10	0.0-2.9	0.5-2.0	.15	.15	5	1	220
	2-27	0-10	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	27-80	0-15	1.50-1.65	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
Klacking--------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-10	1.35-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	1.0-2.0	.15	.15			
	3-25	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	25-37	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	37-42	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	42-54	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	54-80	0-10	1.50-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
475D:												
Graycalm--------	0-2	0-10	1.30-1.55	6.0 -20.0	0.04-0.10	0.0-2.9	0.5-2.0	.15	.15	5	1	220
	2-27	0-10	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	27-80	0-15	1.50-1.65	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
Klacking--------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-10	1.35-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	1.0-2.0	.15	.15			
	3-25	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	25-37	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	37-42	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	42-54	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	54-80	0-10	1.50-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
475E:												
Graycalm--------	0-2	0-10	1.30-1.55	6.0 -20.0	0.04-0.10	0.0-2.9	0.5-2.0	.15	.15	5	1	220
	2-27	0-10	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	27-80	0-15	1.50-1.65	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
475E:												
Klacking--------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-10	1.35-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	1.0-2.0	.15	.15			
	3-25	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	25-37	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	37-42	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	42-54	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	54-80	0-10	1.50-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
476B:												
Klacking--------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-10	1.35-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	1.0-2.0	.15	.15			
	3-25	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	25-37	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	37-42	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	42-54	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	54-80	0-10	1.50-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Perecheney------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	4	1	220
	2-3	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-5.0	.15	.15			
	3-5	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-2.0	.15	.15			
	5-28	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-1.0	.15	.15			
	28-34	5-35	1.35-1.55	0.20-2.0	0.15-0.20	0.0-2.9	0.0-0.5	.32	.32			
	34-71	18-35	1.35-1.55	0.20-2.0	0.15-0.20	0.0-2.9	0.0-0.5	.32	.32			
	71-80	0-15	1.40-1.65	2.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.17	.17			
476D:												
Klacking--------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-10	1.35-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	1.0-2.0	.15	.15			
	3-25	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	25-37	0-10	1.35-1.65	6.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	37-42	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	42-54	2-15	1.55-1.65	2.0 -6.0	0.05-0.11	0.0-2.9	0.0-0.5	.17	.17			
	54-80	0-10	1.50-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Perecheney------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	4	1	220
	2-3	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-5.0	.15	.15			
	3-5	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-2.0	.15	.15			
	5-28	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-1.0	.15	.15			
	28-34	5-35	1.35-1.55	0.20-2.0	0.15-0.20	0.0-2.9	0.0-0.5	.32	.32			
	34-71	18-35	1.35-1.55	0.20-2.0	0.15-0.20	0.0-2.9	0.0-0.5	.32	.32			
	71-80	0-15	1.40-1.65	2.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.17	.17			
490:												
Urban land- Aquents												
491A:												
Geels-----------	0-2	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	4	1	220
	2-29	0-10	1.40-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	0.0-0.5	.15	.15			
	29-49	0-10	1.40-1.65	6.0 -20.0	0.05-0.09	0.0-2.9	0.0-0.5	.15	.15			
	49-55	35-55	1.40-1.70	0.06-0.20	0.09-0.19	6.0-8.9	0.0-0.5	.28	.28			
	55-71	35-55	1.40-1.70	0.06-0.20	0.09-0.19	6.0-8.9	0.0-0.5	.28	.28			
	71-80	27-40	1.45-1.75	0.06-0.20	0.14-0.16	6.0-8.9	0.0-0.5	.37	.37			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
492A:												
Allendale, sandy substratum-----	0-3	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	4	1	220
	3-8	0-10	1.20-1.57	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-2.0	.15	.15			
	8-10	0-10	1.20-1.57	6.0 -20.0	0.07-0.09	0.0-2.9	2.0-4.0	.15	.15			
	10-31	0-10	1.40-1.60	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-3.0	.15	.15			
	31-37	0-18	1.35-1.65	2.0 -6.0	0.06-0.12	0.0-2.9	0.0-0.5	.17	.17			
	37-58	40-60	1.40-1.65	0.00-0.20	0.08-0.16	6.0-8.9	0.0-0.5	.32	.32			
	58-76	35-40	1.40-1.65	0.00-0.20	0.08-0.16	6.0-8.9	0.0-0.5	.32	.32			
	76-80	0-10	1.50-1.65	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
493A:												
Otisco----------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	1-3	0-10	1.25-1.40	6.0 -20.0	0.07-0.09	0.0-2.9	2.0-5.0	.15	.15			
	3-12	0-10	1.25-1.40	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-2.0	.15	.15			
	12-15	0-10	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	2.0-5.0	.15	.15			
	15-20	0-10	1.50-1.70	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-3.0	.15	.15			
	20-27	0-10	1.25-1.40	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-1.0	.15	.15			
	27-36	2-12	1.25-1.40	2.0 -20.0	0.06-0.11	0.0-2.9	0.0-1.0	.17	.17			
	36-55	2-12	1.25-1.40	2.0 -20.0	0.06-0.11	0.0-2.9	0.0-1.0	.17	.17			
	55-80	5-15	1.35-1.45	2.0 -6.0	0.05-0.17	0.0-2.9	0.0-0.5	.15	.15			
495B:												
Gerrish---------	0-1	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	5	1	220
	1-3	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-1.5	.15	.15			
	3-26	0-10	1.30-1.60	20.0 -99.90	0.02-0.04	0.0-2.9	0.0-0.5	.10	.15			
	26-80	0-15	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
495D:												
Gerrish---------	0-1	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	5	1	220
	1-3	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-1.5	.15	.15			
	3-26	0-10	1.30-1.60	20.0 -99.90	0.02-0.04	0.0-2.9	0.0-0.5	.10	.15			
	26-80	0-15	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
495F:												
Gerrish---------	0-1	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	5	1	220
	1-3	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-1.5	.15	.15			
	3-26	0-10	1.30-1.60	20.0 -99.90	0.02-0.04	0.0-2.9	0.0-0.5	.10	.15			
	26-80	0-15	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
496B:												
Gerrish---------	0-1	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	5	1	220
	1-3	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-1.5	.15	.15			
	3-26	0-10	1.30-1.60	20.0 -99.90	0.02-0.04	0.0-2.9	0.0-0.5	.10	.15			
	26-80	0-15	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
Grayling--------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-3	0-10	1.30-1.65	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15			
	3-4	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	4-23	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-30	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	30-80	0-10	1.45-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
496D:												
Gerrish---------	0-1	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	5	1	220
	1-3	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-1.5	.15	.15			
	3-26	0-10	1.30-1.60	20.0 -99.90	0.02-0.04	0.0-2.9	0.0-0.5	.10	.15			
	26-80	0-15	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
496D:												
Grayling--------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-3	0-10	1.30-1.65	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15			
	3-4	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	4-23	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-30	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	30-80	0-10	1.45-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
496F:												
Gerrish---------	0-1	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	5	1	220
	1-3	0-10	1.20-1.50	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-1.5	.15	.15			
	3-26	0-10	1.30-1.60	20.0 -99.90	0.02-0.04	0.0-2.9	0.0-0.5	.10	.15			
	26-80	0-15	1.25-1.60	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
Grayling--------	0-2	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	5	1	220
	2-3	0-10	1.30-1.65	6.0 -20.0	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15			
	3-4	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	4-23	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-30	0-10	1.30-1.65	6.0 -20.0	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	30-80	0-10	1.45-1.65	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
497A:												
Debolt----------	0-3	12-20	1.35-1.60	2.0 -6.0	0.13-0.15	0.0-2.9	1.0-3.0	.24	.24	3	3	86
	3-7	12-20	1.35-1.60	2.0 -6.0	0.13-0.15	0.0-2.9	0.5-2.0	.24	.24			
	7-10	18-35	1.55-1.70	0.20-2.0	0.11-0.20	3.0-5.9	0.0-0.5	.32	.32			
	10-28	35-45	1.40-1.65	0.06-0.60	0.15-0.20	3.0-5.9	0.0-0.5	.32	.32			
	28-33	25-35	1.40-1.65	0.20-0.60	0.15-0.20	3.0-5.9	0.0-0.5	.32	.32			
	33-80	2-15	1.40-1.55	6.0 -20.0	0.02-0.07	0.0-2.9	0.0-0.5	.15	.15			
498A:												
Pinewood--------	0-8	10-20	1.20-1.50	0.6 -2.0	0.12-0.15	0.0-2.9	1.0-3.0	.24	.24	4	3	86
	8-14	5-55	1.40-1.65	0.06-0.6	0.09-0.20	6.0-8.9	0.0-0.5	.37	.37			
	14-41	40-55	1.40-1.65	0.06-0.6	0.10-0.20	6.0-8.9	0.0-0.5	.43	.43			
	41-45	40-55	1.40-1.65	0.06-0.6	0.10-0.20	6.0-8.9	0.0-0.5	.43	.43			
	45-80	0-10	1.50-1.65	6.0 -20.0	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
499:												
Dawson----------	0-5	0-0	0.15-0.30	6.0 -20.0	0.55-0.65	---	65-85	---	---	2	7	38
	5-19	0-0	0.15-0.40	0.20-6.0	0.35-0.45	---	65-85	---	---			
	19-80	0-10	1.55-1.75	6.0 -20.0	0.03-0.10	0.0-2.9	0.0-0.5	.10	.15			
Kinross---------	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	3	2	134
	1-6	0-0	0.10-0.35	2.0 -6.0	0.35-0.45	---	20-70	---	---			
	6-13	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.5-2.0	.15	.15			
	13-15	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	2.0-5.0	.15	.15			
	15-28	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.5-3.0	.15	.15			
	28-45	0-10	1.40-1.70	6.0 -20.0	0.04-0.09	0.0-2.9	0.0-0.5	.15	.15			
	45-80	0-10	1.40-1.70	6.0 -20.0	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
500A:												
Flink-----------	0-2	---	0.30-0.50	0.20-6.0	0.35-0.45	---	40-60	---	---	5	1	220
	2-7	1-5	1.35-1.60	6.0 -20.0	0.06-0.09	0.0-2.9	0.5-2.0	.15	.15			
	7-28	0-6	1.35-1.65	6.0 -20.0	0.05-0.10	0.0-2.9	0.5-3.0	.15	.15			
	28-43	0-6	1.35-1.65	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
	43-55	1-3	1.40-1.70	2.0 -20.0	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
	55-80	10-35	1.40-1.70	0.20-0.6	0.05-0.09	0.0-5.9	0.0-0.5	.32	.32			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
501B:												
Kellogg, sandy substratum-----	0-1	0-0	0.20-0.30	0.6 -6.0	0.35-0.45	---	70-90	---	---	2	1	220
	1-3	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	2.0-4.0	.15	.15			
	3-7	0-10	1.30-1.55	6.0 -20.0	0.07-0.09	0.0-2.9	0.5-2.0	.15	.15			
	7-19	0-10	1.40-1.65	6.0 -20.0	0.03-0.08	0.0-2.9	0.5-3.0	.15	.15			
	19-32	0-10	1.40-1.65	6.0 -20.0	0.03-0.08	0.0-2.9	0.1-0.5	.15	.15			
	32-38	10-35	1.30-1.75	0.06-0.20	0.08-0.16	6.0-8.9	0.0-0.5	.32	.32			
	38-65	30-60	1.30-1.75	0.06-0.20	0.08-0.16	6.0-8.9	0.0-0.5	.32	.32			
	65-80	2-15	1.55-1.75	6.0 -20.0	0.05-0.10	0.0-2.9	0.0-0.5	.20	.20			
502B:												
Kawkawlin-------	0-3	8-27	1.45-1.60	0.6 -2.0	0.20-0.22	0.0-2.9	2.0-4.0	.37	.37	4	5	56
	3-5	8-27	1.45-1.60	0.6 -2.0	0.20-0.22	0.0-2.9	0.5-2.0	.37	.37			
	5-9	18-45	1.45-1.60	0.06-0.20	0.10-0.20	3.0-5.9	0.0-0.5	.32	.37			
	9-32	35-45	1.45-1.60	0.06-0.20	0.10-0.20	3.0-5.9	0.0-0.5	.32	.37			
	32-80	30-40	1.50-1.60	0.06-0.20	0.13-0.20	3.0-5.9	0.0-0.5	.32	.32			
Sims------------	0-9	18-27	1.35-1.55	0.6 -2.0	0.20-0.22	0.0-2.9	3.0-10	.24	.24	4	5	56
	9-36	35-45	1.40-1.70	0.06-0.20	0.12-0.20	3.0-5.9	0.0-0.5	.37	.37			
	36-51	35-40	1.40-1.70	0.06-0.20	0.12-0.20	3.0-5.9	0.0-0.5	.37	.37			
	51-80	35-40	1.40-1.65	0.06-0.20	0.10-0.18	3.0-5.9	0.0-0.5	.37	.37			

Table 19.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
13:						
Tawas-----------	0-4	0-0	80-120	---	4.5-7.8	0
	4-24	0-0	80-120	---	4.5-7.8	0
	24-80	0-10	1.0-3.0	---	5.6-8.4	0-10
Lupton----------	0-15	0-0	140-180	---	5.6-7.8	0
	15-80	0-0	140-180	---	5.6-7.8	0
14:						
Dawson----------	0-5	0-0	---	80-120	3.5-4.4	0
	5-19	0-0	---	150-230	3.5-4.4	0
	19-80	0-10	1.0-2.0	---	4.5-6.5	0
Loxley----------	0-6	0-0	---	50-100	2.0-4.4	0
	6-80	0-0	---	50-120	2.0-4.4	0
15A:						
Croswell--------	0-1	0-0	140-180	---	3.5-6.5	0
	1-2	0-10	1.0-5.0	0.4-3.0	3.5-6.5	0
	2-6	0-10	1.0-5.0	0.4-3.0	3.5-6.5	0
	6-24	0-10	1.0-3.0	---	4.5-6.0	0
	24-42	0-10	1.0-3.0	---	4.5-7.3	0
	42-80	0-10	1.0-2.0	---	5.1-7.3	0
Au Gres---------	0-1	0-0	140-180	---	3.5-7.3	0
	1-3	0-8	5.0-10	---	3.5-7.3	0
	3-5	0-8	5.0-10	---	3.5-7.3	0
	5-7	0-8	2.0-5.0	---	3.5-6.0	0
	7-23	0-8	2.0-5.0	---	4.5-7.3	0
	23-33	0-8	2.0-5.0	---	4.5-7.3	0
	33-80	0-8	1.0-2.0	---	4.5-7.3	0
16B:						
Graycalm--------	0-2	0-10	4.0-10	---	4.5-6.5	0
	2-27	0-10	2.0-4.0	---	4.5-7.3	0
	27-80	0-15	1.0-5.0	---	4.5-7.3	0
17A:						
Croswell--------	0-1	0-0	140-180	---	3.5-6.5	0
	1-2	0-10	1.0-5.0	0.4-3.0	3.5-6.5	0
	2-6	0-10	1.0-5.0	0.4-3.0	3.5-6.5	0
	6-24	0-10	1.0-3.0	---	4.5-6.0	0
	24-42	0-10	1.0-3.0	---	4.5-7.3	0
	42-80	0-10	1.0-2.0	---	5.1-7.3	0
18A:						
Au Gres---------	0-1	0-0	140-180	---	3.5-7.3	0
	1-3	0-8	5.0-10	---	3.5-7.3	0
	3-5	0-8	5.0-10	---	3.5-7.3	0
	5-7	0-8	2.0-5.0	---	3.5-6.0	0
	7-23	0-8	2.0-5.0	---	4.5-7.3	0
	23-33	0-8	2.0-5.0	---	4.5-7.3	0
	33-80	0-8	1.0-2.0	---	4.5-7.3	0
20B:						
Graycalm--------	0-2	0-10	4.0-10	---	4.5-6.5	0
	2-27	0-10	2.0-4.0	---	4.5-7.3	0
	27-80	0-15	1.0-5.0	---	4.5-7.3	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
20B:						
Grayling--------	0-2	0-0	140-180	---	3.5-5.5	0
	2-3	0-10	---	2.0-14	3.5-5.5	0
	3-4	0-10	---	1.0-4.0	3.5-5.5	0
	4-23	0-10	---	1.0-4.0	3.5-5.5	0
	23-30	0-10	---	1.0-4.0	3.5-5.5	0
	30-80	0-10	1.0-2.0	---	5.6-7.3	0
20D:						
Graycalm--------	0-2	0-10	4.0-10	---	4.5-6.5	0
	2-27	0-10	2.0-4.0	---	4.5-7.3	0
	27-80	0-15	1.0-5.0	---	4.5-7.3	0
Grayling--------	0-2	0-0	140-180	---	3.5-5.5	0
	2-3	0-10	---	2.0-14	3.5-5.5	0
	3-4	0-10	---	1.0-4.0	3.5-5.5	0
	4-23	0-10	---	1.0-4.0	3.5-5.5	0
	23-30	0-10	---	1.0-4.0	3.5-5.5	0
	30-80	0-10	1.0-2.0	---	5.6-7.3	0
20F:						
Graycalm--------	0-2	0-10	4.0-10	---	4.5-6.5	0
	2-27	0-10	2.0-4.0	---	4.5-7.3	0
	27-80	0-15	1.0-5.0	---	4.5-7.3	0
Grayling--------	0-2	0-0	140-180	---	3.5-5.5	0
	2-3	0-10	---	2.0-14	3.5-5.5	0
	3-4	0-10	---	1.0-4.0	3.5-5.5	0
	4-23	0-10	---	1.0-4.0	3.5-5.5	0
	23-30	0-10	---	1.0-4.0	3.5-5.5	0
	30-80	0-10	1.0-2.0	---	5.6-7.3	0
23:						
Ausable---------	0-9	0-0	140-180	---	5.1-7.3	0
	9-44	0-10	5.0-25	---	6.1-7.8	0
	44-80	0-10	5.0-25	---	6.1-7.8	0
Bowstring-------	0-34	0-0	---	---	5.6-8.4	0
	34-38	0-5	---	---	5.6-8.4	0
	38-80	0-0	---	---	5.6-8.4	0
24A:						
Kinross---------	0-1	0-0	140-180	---	3.5-5.0	0
	1-6	0-0	---	100-140	3.5-5.0	0
	6-13	0-10	1.0-10	0.4-2.5	3.5-5.0	0
	13-15	0-10	1.0-10	0.4-2.5	3.5-6.0	0
	15-28	0-10	1.0-10	0.4-2.5	3.5-6.0	0
	28-45	0-10	1.0-10	0.4-2.5	4.5-6.5	0
	45-80	0-10	1.0-2.0	---	4.5-6.5	0
Au Gres---------	0-1	0-0	140-180	---	3.5-7.3	0
	1-3	0-8	5.0-10	---	3.5-7.3	0
	3-5	0-8	5.0-10	---	3.5-7.3	0
	5-7	0-8	2.0-5.0	---	3.5-6.0	0
	7-23	0-8	2.0-5.0	---	4.5-7.3	0
	23-33	0-8	2.0-5.0	---	4.5-7.3	0
	33-80	0-8	1.0-2.0	---	4.5-7.3	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
26B:						
Cublake----------	0-2	0-0	140-180	---	3.6-6.5	0
	2-8	0-10	1.0-5.0	0.4-3.0	3.6-6.5	0
	8-37	0-10	1.0-3.0	---	4.5-7.3	0
	37-53	0-10	0.0-5.0	---	5.1-6.5	0
	53-80	10-25	2.0-20	---	5.1-8.4	0-20
34B:						
Kneff-----------	0-8	10-18	5.0-15	---	4.5-7.3	0
	8-14	10-30	2.0-15	---	4.5-6.5	0
	14-29	18-35	3.0-15	---	5.1-6.5	0
	29-61	10-35	2.0-15	---	6.6-8.4	0-20
	61-80	5-35	1.0-15	---	7.4-8.4	5-20
35:						
Kinross---------	0-1	0-0	140-180	---	3.5-5.0	0
	1-6	0-0	---	100-140	3.5-5.0	0
	6-13	0-10	1.0-10	0.4-2.5	3.5-5.0	0
	13-15	0-10	1.0-10	0.4-2.5	3.5-6.0	0
	15-28	0-10	1.0-10	0.4-2.5	3.5-6.0	0
	28-45	0-10	1.0-10	0.4-2.5	4.5-6.5	0
	45-80	0-10	1.0-2.0	---	4.5-6.5	0
47D:						
Graycalm--------	0-2	0-10	4.0-10	---	4.5-6.5	0
	2-27	0-10	2.0-4.0	---	4.5-7.3	0
	27-80	0-15	1.0-5.0	---	4.5-7.3	0
47F:						
Graycalm--------	0-2	0-10	4.0-10	---	4.5-6.5	0
	2-27	0-10	2.0-4.0	---	4.5-7.3	0
	27-80	0-15	1.0-5.0	---	4.5-7.3	0
50B:						
Au Gres---------	0-1	0-0	140-180	---	3.5-7.3	0
	1-3	0-8	5.0-10	---	3.5-7.3	0
	3-5	0-8	5.0-10	---	3.5-7.3	0
	5-7	0-8	2.0-5.0	---	3.5-6.0	0
	7-23	0-8	2.0-5.0	---	4.5-7.3	0
	23-33	0-8	2.0-5.0	---	4.5-7.3	0
	33-80	0-8	1.0-2.0	---	4.5-7.3	0
Kinross---------	0-1	0-0	140-180	---	3.5-5.0	0
	1-6	0-0	---	100-140	3.5-5.0	0
	6-13	0-10	1.0-10	0.4-2.5	3.5-5.0	0
	13-15	0-10	1.0-10	0.4-2.5	3.5-6.0	0
	15-28	0-10	1.0-10	0.4-2.5	3.5-6.0	0
	28-45	0-10	1.0-10	0.4-2.5	4.5-6.5	0
	45-80	0-10	1.0-2.0	---	4.5-6.5	0
Croswell--------	0-1	0-0	140-180	---	3.5-6.5	0
	1-2	0-10	1.0-5.0	0.4-3.0	3.5-6.5	0
	2-6	0-10	1.0-5.0	0.4-3.0	3.5-6.5	0
	6-24	0-10	1.0-3.0	---	4.5-6.0	0
	24-42	0-10	1.0-3.0	---	4.5-7.3	0
	42-80	0-10	1.0-2.0	---	5.1-7.3	0
51:						
Tawas-----------	0-4	---	80-120	---	4.5-7.8	0
	4-24	---	80-120	---	4.5-7.8	0
	24-80	0-10	1.0-3.0	---	5.6-8.4	0-10

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
51:						
Leafriver-------	0-10	---	100-180	---	4.5-7.3	0
	10-12	3-15	10-50	---	3.5-7.3	0
	12-80	0-10	1.0-15	---	3.5-7.3	0
57B:						
Kawkawlin-------	0-3	8-27	5.0-20	---	5.1-7.3	0
	3-5	8-27	5.0-20	---	5.1-7.3	0
	5-9	18-45	5.0-20	---	4.5-7.8	0-20
	9-32	35-45	5.0-20	---	5.1-7.8	0-20
	32-80	30-40	5.0-15	---	7.9-8.4	20-30
58A:						
Wakeley---------	0-4	---	80-120	---	5.6-7.8	0
	4-38	0-15	1.0-10	---	5.6-7.8	0
	38-80	35-40	5.0-25	---	7.4-8.4	10-30
Allendale-------	0-2	0-0	140-180	---	3.5-7.3	0
	2-7	0-10	4.0-20	---	3.5-7.3	0
	7-26	0-10	4.0-20	---	4.5-7.3	0
	26-37	0-15	1.0-5.0	---	4.5-7.3	0
	37-39	0-15	1.0-5.0	---	4.5-7.3	0
	39-47	40-60	8.0-25	---	6.1-8.4	0-20
	47-80	40-60	8.0-25	---	6.1-8.4	0-20
67A:						
Bowers----------	0-3	10-20	5.0-20	---	5.6-7.3	0
	3-16	10-20	5.0-20	---	5.6-7.3	0
	16-20	10-40	5.0-20	---	5.6-7.3	0
	20-43	18-40	5.0-20	---	6.1-7.3	0
	43-52	18-40	5.0-20	---	7.4-8.4	20-40
	52-80	18-40	5.0-20	---	7.4-8.4	20-40
Deerheart-------	0-6	12-27	10-20	---	6.1-7.3	0
	6-27	27-35	5.0-15	---	6.1-7.8	0
	27-43	10-35	5.0-15	---	7.4-8.4	15-30
	43-80	10-40	3.0-15	---	7.4-8.4	15-30
75B:						
Rubicon---------	0-1	0-0	140-180	---	4.5-6.0	0
	1-3	0-5	1.0-6.0	0.4-3.0	4.5-6.0	0
	3-7	0-10	1.0-4.0	0.4-2.5	4.5-6.0	0
	7-21	0-10	1.0-4.0	0.4-2.5	4.5-6.0	0
	21-31	0-10	1.0-4.0	0.4-2.5	4.5-6.0	0
	31-80	0-5	1.0-2.0	---	4.5-6.5	0
75D:						
Rubicon---------	0-1	0-0	140-180	---	4.5-6.0	0
	1-3	0-5	1.0-6.0	0.4-3.0	4.5-6.0	0
	3-7	0-10	1.0-4.0	0.4-2.5	4.5-6.0	0
	7-21	0-10	1.0-4.0	0.4-2.5	4.5-6.0	0
	21-31	0-10	1.0-4.0	0.4-2.5	4.5-6.0	0
	31-80	0-5	1.0-2.0	---	4.5-6.5	0
78.						
Pits						

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
81B:						
Grayling--------	0-2	0-0	140-180	---	3.5-5.5	0
	2-3	0-10	---	2.0-14	3.5-5.5	0
	3-4	0-10	---	1.0-4.0	3.5-5.5	0
	4-23	0-10	---	1.0-4.0	3.5-5.5	0
	23-30	0-10	---	1.0-4.0	3.5-5.5	0
	30-80	0-10	1.0-2.0	---	5.6-7.3	0
81D:						
Grayling--------	0-2	0-0	140-180	---	3.5-5.5	0
	2-3	0-10	---	2.0-14	3.5-5.5	0
	3-4	0-10	---	1.0-4.0	3.5-5.5	0
	4-23	0-10	---	1.0-4.0	3.5-5.5	0
	23-30	0-10	---	1.0-4.0	3.5-5.5	0
	30-80	0-10	1.0-2.0	---	5.6-7.3	0
81F:						
Grayling--------	0-2	0-0	140-180	---	3.5-5.5	0
	2-3	0-10	---	2.0-14	3.5-5.5	0
	3-4	0-10	---	1.0-4.0	3.5-5.5	0
	4-23	0-10	---	1.0-4.0	3.5-5.5	0
	23-30	0-10	---	1.0-4.0	3.5-5.5	0
	30-80	0-10	1.0-2.0	---	5.6-7.3	0
82B:						
Udorthents------	0-80	0-45	---	---	---	---
83B:						
Udipsamments----	0-80	0-10	---	---	3.5-8.4	---
83F:						
Udipsamments----	0-80	0-10	---	---	3.5-8.4	---
86.						
Histosols and Aquents						
87:						
Ausable---------	0-9	0-0	140-180	---	5.1-7.3	0
	9-44	0-10	5.0-25	---	6.1-7.8	0
	44-80	0-10	5.0-25	---	6.1-7.8	0
90B:						
Chinwhisker-----	0-2	0-0	140-180	---	4.5-6.5	0
	2-3	0-8	5.0-10	---	4.5-6.5	0
	3-7	0-5	4.0-10	---	4.5-6.5	0
	7-23	0-10	---	2.0-3.0	4.5-7.3	0
	23-72	0-10	1.0-2.0	---	4.5-7.3	0
	72-80	3-10	2.0-4.0	---	5.6-8.4	0-10
102D:						
Curtisville-----	0-4	7-27	2.0-20	---	5.6-6.5	0
	4-9	15-30	3.0-12	---	5.6-6.5	0
	9-16	15-30	3.0-12	---	5.6-6.5	0
	16-31	35-45	7.0-18	---	5.6-7.3	0
	31-33	30-40	6.0-16	---	7.4-8.4	10-30
	33-80	30-40	6.0-16	---	7.4-8.4	10-30

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
103B:						
Nester----------	0-7	5-20	5.0-15	---	5.6-7.3	0
	7-9	5-20	5.0-15	---	5.6-7.3	0
	9-12	5-40	2.0-10	---	5.6-7.3	0
	12-33	35-40	5.0-20	---	5.6-7.3	0
	33-80	30-40	5.0-20	---	7.9-8.4	20-30
103C:						
Nester----------	0-7	5-20	5.0-15	---	5.6-7.3	0
	7-9	5-20	5.0-15	---	5.6-7.3	0
	9-12	5-40	2.0-10	---	5.6-7.3	0
	12-33	35-40	5.0-20	---	5.6-7.3	0
	33-80	30-40	5.0-20	---	7.9-8.4	20-30
114A:						
Ingalls---------	0-1	0-0	140-180	---	4.5-7.3	0
	1-2	0-5	3.0-10	---	4.5-7.3	0
	2-7	0-5	3.0-10	---	4.5-7.3	0
	7-11	3-10	1.0-10	---	4.5-7.3	0
	11-26	3-15	1.0-10	---	5.1-7.3	0
	26-33	3-15	1.0-10	---	5.1-7.3	0
	33-80	2-20	1.0-15	---	5.6-8.4	0-10
120B:						
Morganlake------	0-2	1-10	---	2.0-7.0	3.5-7.3	0
	2-13	1-10	---	1.0-7.0	3.5-6.0	0
	13-25	1-10	---	1.0-4.0	3.5-6.0	0
	25-37	27-35	5.0-14	---	5.6-7.8	0-10
	37-80	27-35	5.0-14	---	7.4-8.4	10-30
120C:						
Morganlake------	0-2	1-10	---	2.0-7.0	3.5-7.3	0
	2-13	1-10	---	1.0-7.0	3.5-6.0	0
	13-25	1-10	---	1.0-4.0	3.5-6.0	0
	25-37	27-35	5.0-14	---	5.6-7.8	0-10
	37-80	27-35	5.0-14	---	7.4-8.4	10-30
123D:						
Klacking--------	0-1	0-0	140-180	---	4.5-6.0	0
	1-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-25	0-10	2.0-6.0	---	4.5-7.3	0
	25-37	0-10	2.0-6.0	---	4.5-7.3	0
	37-42	2-15	2.0-6.0	---	4.5-7.3	0
	42-54	2-15	2.0-6.0	---	4.5-7.3	0
	54-80	0-10	2.0-6.0	---	4.5-7.3	0
144B:						
Perecheney------	0-2	0-0	140-180	---	4.5-6.0	0
	2-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-5	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	5-28	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	28-34	5-35	3.0-15	---	5.1-6.5	0
	34-71	18-35	3.0-15	---	5.6-8.4	0-10
	71-80	0-15	1.0-5.0	---	5.6-8.4	0-10

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
144C:						
Perecheney------	0-2	0-0	140-180	---	4.5-6.0	0
	2-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-5	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	5-28	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	28-34	5-35	3.0-15	---	5.1-7.3	0
	34-71	18-35	3.0-15	---	5.6-8.4	0-10
	71-80	0-15	1.0-5.0	---	5.6-8.4	0-10
159A:						
Finch-----------	0-3	0-0	140-180	---	4.5-6.0	0
	3-5	0-10	1.0-5.0	0.4-3.0	4.5-6.0	0
	5-16	0-10	1.0-5.0	0.4-3.0	4.5-6.0	0
	16-20	5-10	1.0-4.0	---	4.5-6.0	0
	20-22	5-10	1.0-4.0	---	4.5-6.0	0
	22-35	5-10	1.0-4.0	---	4.5-6.0	0
	35-45	5-10	1.0-4.0	---	5.1-6.0	0
	45-80	0-10	1.0-4.0	---	5.1-6.0	0
307B:						
Klacking--------	0-1	0-0	140-180	---	4.5-6.0	0
	1-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-25	0-10	2.0-6.0	---	4.5-7.3	0
	25-37	0-10	2.0-6.0	---	4.5-7.3	0
	37-42	2-15	2.0-6.0	---	4.5-7.3	0
	42-54	2-15	2.0-6.0	---	4.5-7.3	0
	54-80	0-10	2.0-6.0	---	4.5-7.3	0
307E:						
Klacking--------	0-1	0-0	140-180	---	4.5-6.0	0
	1-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-25	0-10	2.0-6.0	---	4.5-7.3	0
	25-37	0-10	2.0-6.0	---	4.5-7.3	0
	37-42	2-15	2.0-6.0	---	4.5-7.3	0
	42-54	2-15	2.0-6.0	---	4.5-7.3	0
	54-80	0-10	2.0-6.0	---	4.5-7.3	0
360:						
Wakeley---------	0-4	---	80-120	---	5.6-7.8	0
	4-38	0-15	1.0-10	---	5.6-7.8	0
	38-80	35-40	5.0-25	---	7.4-8.4	10-30
368A:						
Au Gres---------	0-1	0-0	140-180	---	3.5-7.3	0
	1-3	0-8	5.0-10	---	3.5-7.3	0
	3-5	0-8	5.0-10	---	3.5-7.3	0
	5-7	0-8	2.0-5.0	---	3.5-6.0	0
	7-23	0-8	2.0-5.0	---	4.5-7.3	0
	23-33	0-8	2.0-5.0	---	4.5-7.3	0
	33-80	0-8	1.0-2.0	---	4.5-7.3	0
Deford----------	0-2	---	80-120	---	5.1-7.8	---
	2-80	0-12	1.0-5.0	---	5.1-8.4	---
369:						
Deford----------	0-2	---	80-120	---	5.1-7.8	---
	2-80	0-12	1.0-5.0	---	5.1-8.4	---
380.						
Access denied						

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
382B:						
Proper----------	0-2	0-0	140-180	---	3.5-6.5	0
	2-4	0-5	3.0-10	---	3.5-6.5	0
	4-11	0-5	1.0-2.0	---	3.5-6.5	0
	11-12	0-5	1.0-4.0	---	4.5-6.0	0
	12-47	0-5	1.0-2.0	---	4.5-6.0	0
	47-80	0-5	1.0-2.0	---	5.1-7.3	0
408:						
Sims------------	0-9	18-27	10-20	---	6.1-7.8	0
	9-36	35-45	5.0-20	---	6.1-7.8	0-10
	36-51	35-40	5.0-20	---	7.4-8.4	5-30
	51-80	35-40	5.0-15	---	7.4-8.4	10-30
410B:						
Proper----------	0-2	0-0	140-180	---	3.5-6.5	0
	2-4	0-5	3.0-10	---	3.5-6.5	0
	4-11	0-5	1.0-2.0	---	3.5-6.5	0
	11-12	0-5	1.0-4.0	---	4.5-6.0	0
	12-47	0-5	1.0-2.0	---	4.5-6.0	0
	47-80	0-5	1.0-2.0	---	5.1-7.3	0
Finch-----------	0-3	0-0	140-180	---	4.5-6.0	0
	3-5	0-10	1.0-5.0	0.4-3.0	4.5-6.0	0
	5-16	0-10	1.0-5.0	0.4-3.0	4.5-6.0	0
	16-20	5-10	1.0-4.0	---	4.5-6.0	0
	20-22	5-10	1.0-4.0	---	4.5-6.0	0
	22-35	5-10	1.0-4.0	---	4.5-6.0	0
	35-45	5-10	1.0-4.0	---	5.1-6.0	0
	45-80	0-10	1.0-4.0	---	5.1-6.0	0
Deford----------	0-2	---	80-120	---	5.1-7.8	---
	2-80	0-12	1.0-5.0	---	5.1-8.4	---
429D:						
Menominee-------	0-4	0-10	2.0-10	---	3.5-6.5	0
	4-7	0-10	2.0-10	---	3.5-6.5	0
	7-23	5-15	1.0-6.0	---	3.5-6.5	0
	23-39	10-35	5.0-20	---	5.1-7.8	0-10
	39-59	18-35	5.0-20	---	5.1-7.8	0-10
	59-80	12-35	5.0-25	---	6.1-8.4	0-30
441B:						
Morganlake------	0-2	1-10	---	2.0-7.0	3.5-7.3	0
	2-13	1-10	---	1.0-7.0	3.5-6.0	0
	13-25	1-10	---	1.0-4.0	3.5-6.0	0
	25-37	27-35	5.0-14	---	5.6-7.8	0-10
	37-80	27-35	5.0-14	---	7.4-8.4	10-30
Nester----------	0-7	5-20	5.0-15	---	5.6-7.3	0
	7-9	5-20	5.0-15	---	5.6-7.3	0
	9-12	5-40	2.0-10	---	5.6-7.3	0
	12-33	35-40	5.0-20	---	5.6-7.3	0
	33-80	30-40	5.0-20	---	7.9-8.4	20-30
441C:						
Morganlake------	0-2	1-10	---	2.0-7.0	3.5-7.3	0
	2-13	1-10	---	1.0-7.0	3.5-6.0	0
	13-25	1-10	---	1.0-4.0	3.5-6.0	0
	25-37	27-35	5.0-14	---	5.6-7.8	0-10
	37-80	27-35	5.0-14	---	7.4-8.4	10-30

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
441C:						
Nester----------	0-7	5-20	5.0-15	---	5.6-7.3	0
	7-9	5-20	5.0-15	---	5.6-7.3	0
	9-12	5-40	2.0-10	---	5.6-7.3	0
	12-33	35-40	5.0-20	---	5.6-7.3	0
	33-80	30-40	5.0-20	---	7.9-8.4	20-30
442D:						
Menominee-------	0-4	0-10	2.0-10	---	3.5-6.5	0
	4-7	0-10	2.0-10	---	3.5-6.5	0
	7-23	5-15	1.0-6.0	---	3.5-6.5	0
	23-39	10-35	5.0-20	---	5.1-7.8	0-10
	39-59	18-35	5.0-20	---	5.1-7.8	0-10
	59-80	12-35	5.0-25	---	6.1-8.4	0-30
Curtisville-----	0-4	7-27	2.0-20	---	5.6-6.5	0
	4-9	15-30	3.0-12	---	5.6-6.5	0
	9-16	15-30	3.0-12	---	5.6-6.5	0
	16-31	35-45	7.0-18	---	5.6-7.3	0
	31-33	30-40	6.0-16	---	7.4-8.4	10-30
	33-80	30-40	6.0-16	---	7.4-8.4	10-30
473:						
Deford----------	0-2	---	80-120	---	5.1-7.8	---
	2-80	0-12	1.0-5.0	---	5.1-8.4	---
Kinross---------	0-1	0-0	140-180	---	3.5-5.0	0
	1-6	0-0	---	100-140	3.5-5.0	0
	6-13	0-10	1.0-10	0.4-2.5	3.5-5.0	0
	13-15	0-10	1.0-10	0.4-2.5	3.5-6.0	0
	15-28	0-10	1.0-10	0.4-2.5	3.5-6.0	0
	28-45	0-10	1.0-10	0.4-2.5	4.5-6.5	0
	45-80	0-10	1.0-2.0	---	4.5-6.5	0
474.						
Histosols-Fluvaquents						
475B:						
Graycalm--------	0-2	0-10	4.0-10	---	4.5-6.5	0
	2-27	0-10	2.0-4.0	---	4.5-7.3	0
	27-80	0-15	1.0-5.0	---	4.5-7.3	0
Klacking--------	0-1	0-0	140-180	---	4.5-6.0	0
	1-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-25	0-10	2.0-6.0	---	4.5-7.3	0
	25-37	0-10	2.0-6.0	---	4.5-7.3	0
	37-42	2-15	2.0-6.0	---	4.5-7.3	0
	42-54	2-15	2.0-6.0	---	4.5-7.3	0
	54-80	0-10	2.0-6.0	---	4.5-7.3	0
475D:						
Graycalm--------	0-2	0-10	4.0-10	---	4.5-6.5	0
	2-27	0-10	2.0-4.0	---	4.5-7.3	0
	27-80	0-15	1.0-5.0	---	4.5-7.3	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
475D:						
Klacking--------	0-1	0-0	140-180	---	4.5-6.0	0
	1-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-25	0-10	2.0-6.0	---	4.5-7.3	0
	25-37	0-10	2.0-6.0	---	4.5-7.3	0
	37-42	2-15	2.0-6.0	---	4.5-7.3	0
	42-54	2-15	2.0-6.0	---	4.5-7.3	0
	54-80	0-10	2.0-6.0	---	4.5-7.3	0
475E:						
Graycalm--------	0-2	0-10	4.0-10	---	4.5-6.5	0
	2-27	0-10	2.0-4.0	---	4.5-7.3	0
	27-80	0-15	1.0-5.0	---	4.5-7.3	0
Klacking--------	0-1	0-0	140-180	---	4.5-6.0	0
	1-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-25	0-10	2.0-6.0	---	4.5-7.3	0
	25-37	0-10	2.0-6.0	---	4.5-7.3	0
	37-42	2-15	2.0-6.0	---	4.5-7.3	0
	42-54	2-15	2.0-6.0	---	4.5-7.3	0
	54-80	0-10	2.0-6.0	---	4.5-7.3	0
476B:						
Klacking--------	0-1	0-0	140-180	---	4.5-6.0	0
	1-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-25	0-10	2.0-6.0	---	4.5-7.3	0
	25-37	0-10	2.0-6.0	---	4.5-7.3	0
	37-42	2-15	2.0-6.0	---	4.5-7.3	0
	42-54	2-15	2.0-6.0	---	4.5-7.3	0
	54-80	0-10	2.0-6.0	---	4.5-7.3	0
Perecheney------	0-2	0-0	140-180	---	4.5-6.0	0
	2-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-5	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	5-28	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	28-34	5-35	3.0-15	---	5.1-7.3	0
	34-71	18-35	3.0-15	---	5.6-8.4	0-10
	71-80	0-15	1.0-5.0	---	5.6-8.4	0-10
476D:						
Klacking--------	0-1	0-0	140-180	---	4.5-6.0	0
	1-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-25	0-10	2.0-6.0	---	4.5-7.3	0
	25-37	0-10	2.0-6.0	---	4.5-7.3	0
	37-42	2-15	2.0-6.0	---	4.5-7.3	0
	42-54	2-15	2.0-6.0	---	4.5-7.3	0
	54-80	0-10	2.0-6.0	---	4.5-7.3	0
Perecheney------	0-2	0-0	140-180	---	4.5-6.0	0
	2-3	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	3-5	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	5-28	0-10	2.0-10	0.4-3.0	4.5-6.0	0
	28-34	5-35	3.0-15	---	5.1-7.3	0
	34-71	18-35	3.0-15	---	5.6-8.4	0-10
	71-80	0-15	1.0-5.0	---	5.6-8.4	0-10
490.						
Urban land-Aquents						

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
491A:						
Geels-----------	0-2	0-10	2.0-10	---	4.5-5.5	0
	2-29	0-10	1.0-5.0	---	5.1-7.3	0
	29-49	0-10	1.0-5.0	---	5.6-7.3	0
	49-55	35-55	5.0-20	---	5.6-7.8	0-5
	55-71	35-55	5.0-20	---	5.6-8.4	0-30
	71-80	27-40	5.0-15	---	6.6-8.4	0-30
492A:						
Allendale, sandy substratum-----	0-3	0-0	140-180	---	3.5-7.3	0
	3-8	0-10	5.0-15	---	3.5-7.3	0
	8-10	0-10	5.0-15	---	4.5-7.3	0
	10-31	0-10	1.0-4.0	---	4.5-7.3	0
	31-37	0-18	1.0-10	---	4.5-7.3	0
	37-58	40-60	10-25	---	4.5-8.4	0-20
	58-76	35-40	10-25	---	4.5-8.4	0-20
	76-80	0-10	1.0-4.0	---	6.1-8.4	0-10
493A:						
Otisco----------	0-1	0-0	140-180	---	3.5-6.5	0
	1-3	0-10	2.0-5.0	---	3.5-6.5	0
	3-12	0-10	2.0-5.0	---	3.5-6.5	0
	12-15	0-10	2.0-5.0	---	4.5-6.5	0
	15-20	0-10	2.0-5.0	---	4.5-6.5	0
	20-27	0-10	2.0-5.0	---	5.1-6.5	0
	27-36	2-12	1.0-5.0	---	5.1-6.5	0
	36-55	2-12	1.0-5.0	---	5.1-6.5	0
	55-80	5-15	1.0-10	---	5.6-7.8	0-10
495B:						
Gerrish---------	0-1	0-10	3.0-7.0	---	3.5-6.5	0
	1-3	0-10	3.0-7.0	---	3.5-6.5	0
	3-26	0-10	1.0-4.0	---	4.5-6.5	0
	26-80	0-15	1.0-4.0	---	5.1-7.3	0
495D:						
Gerrish---------	0-1	0-10	3.0-7.0	---	3.5-6.5	0
	1-3	0-10	3.0-7.0	---	3.5-6.5	0
	3-26	0-10	1.0-4.0	---	4.5-6.5	0
	26-80	0-15	1.0-4.0	---	5.1-7.3	0
495F:						
Gerrish---------	0-1	0-10	3.0-7.0	---	3.5-6.5	0
	1-3	0-10	3.0-7.0	---	3.5-6.5	0
	3-26	0-10	1.0-4.0	---	4.5-6.5	0
	26-80	0-15	1.0-4.0	---	5.1-7.3	0
496B:						
Gerrish---------	0-1	0-10	3.0-7.0	---	3.5-6.5	0
	1-3	0-10	3.0-7.0	---	3.5-6.5	0
	3-26	0-10	1.0-4.0	---	4.5-6.5	0
	26-80	0-15	1.0-4.0	---	5.1-7.3	0
Grayling--------	0-2	0-0	140-180	---	3.5-5.5	0
	2-3	0-10	---	2.0-14	3.5-5.5	0
	3-4	0-10	---	1.0-4.0	3.5-5.5	0
	4-23	0-10	---	1.0-4.0	3.5-5.5	0
	23-30	0-10	---	1.0-4.0	3.5-5.5	0
	30-80	0-10	1.0-2.0	---	5.6-7.3	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
496D:						
Gerrish----------	0-1	0-10	3.0-7.0	---	3.5-6.5	0
	1-3	0-10	3.0-7.0	---	3.5-6.5	0
	3-26	0-10	1.0-4.0	---	4.5-6.5	0
	26-80	0-15	1.0-4.0	---	5.1-7.3	0
Grayling---------	0-2	0-0	140-180	---	3.5-5.5	0
	2-3	0-10	---	2.0-14	3.5-5.5	0
	3-4	0-10	---	1.0-4.0	3.5-5.5	0
	4-23	0-10	---	1.0-4.0	3.5-5.5	0
	23-30	0-10	---	1.0-4.0	3.5-5.5	0
	30-80	0-10	1.0-2.0	---	5.6-7.3	0
496F:						
Gerrish----------	0-1	0-10	3.0-7.0	---	3.5-6.5	0
	1-3	0-10	3.0-7.0	---	3.5-6.5	0
	3-26	0-10	1.0-4.0	---	4.5-6.5	0
	26-80	0-15	1.0-4.0	---	5.1-7.3	0
Grayling---------	0-2	0-0	140-180	---	3.5-5.5	0
	2-3	0-10	---	2.0-14	3.5-5.5	0
	3-4	0-10	---	1.0-4.0	3.5-5.5	0
	4-23	0-10	---	1.0-4.0	3.5-5.5	0
	23-30	0-10	---	1.0-4.0	3.5-5.5	0
	30-80	0-10	1.0-2.0	---	5.6-7.3	0
497A:						
Debolt-----------	0-3	12-20	4.0-15	---	5.1-6.5	0
	3-7	12-20	4.0-15	---	5.1-6.5	0
	7-10	18-35	5.0-20	---	5.1-6.5	0
	10-28	35-45	5.0-20	---	5.1-7.3	0
	28-33	25-35	5.0-20	---	5.1-7.3	0
	33-80	2-15	1.0-3.0	---	5.1-7.3	0
498A:						
Pinewood---------	0-8	10-20	4.0-15	---	5.1-7.3	0
	8-14	5-55	5.0-20	---	5.1-7.3	0
	14-41	40-55	5.0-20	---	5.1-7.3	0
	41-45	40-55	5.0-20	---	5.1-7.8	0-20
	45-80	0-10	1.0-4.0	---	7.4-8.4	0-20
499:						
Dawson-----------	0-5	0-0	---	80-120	3.5-4.4	0
	5-19	0-0	---	150-230	3.5-4.4	0
	19-80	0-10	1.0-2.0	---	4.5-6.5	0
Kinross----------	0-1	0-0	140-180	---	3.5-5.0	0
	1-6	0-0	---	100-140	3.5-5.0	0
	6-13	0-10	1.0-10	0.4-2.5	3.5-5.0	0
	13-15	0-10	1.0-10	0.4-2.5	3.5-6.0	0
	15-28	0-10	1.0-10	0.4-2.5	3.5-6.0	0
	28-45	0-10	1.0-10	0.4-2.5	4.5-6.5	0
	45-80	0-10	1.0-2.0	---	4.5-6.5	0
500A:						
Flink------------	0-2	---	80-120	---	5.1-6.0	---
	2-7	1-5	---	2.0-10	5.1-6.0	0
	7-28	0-6	---	2.0-10	5.1-6.0	0
	28-43	0-6	---	2.0-10	5.1-7.3	0
	43-55	1-3	---	0.0-4.0	5.1-7.3	0
	55-80	10-35	0.0-3.0	---	7.4-8.4	20-40

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	meq/100g	pH	Pct
501B:						
Kellogg, sandy substratum-----	0-1	0-0	140-180	---	4.5-6.0	0
	1-3	0-10	5.0-15	0.4-3.0	4.5-6.0	0
	3-7	0-10	5.0-15	0.4-3.0	4.5-6.0	0
	7-19	0-10	1.0-5.0	0.4-2.5	4.5-6.0	0
	19-32	0-10	1.0-5.0	0.4-2.5	4.5-6.0	0
	32-38	10-35	5.0-24	---	6.1-7.3	0-5
	38-65	30-60	5.0-24	---	6.1-7.8	0-5
	65-80	2-15	1.0-5.0	---	5.6-7.8	0-5
502B:						
Kawkawlin-------	0-3	8-27	5.0-20	---	5.1-7.3	0
	3-5	8-27	5.0-20	---	5.1-7.3	0
	5-9	18-45	5.0-20	---	4.5-7.8	0-20
	9-32	35-45	5.0-20	---	5.1-7.8	0-20
	32-80	30-40	5.0-15	---	7.9-8.4	20-30
Sims------------	0-9	18-27	10-20	---	6.1-7.8	0
	9-36	35-45	5.0-20	---	6.1-7.8	0-10
	36-51	35-40	5.0-20	---	7.4-8.4	5-20
	51-80	35-40	5.0-15	---	7.4-8.4	10-30

Table 20.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Initial	Total		Uncoated steel	Concrete
		In	In	In	In			
13:								
Tawas	---	>80	---	0-12	12-24	High	High	Moderate.
Lupton	---	>80	---	6-18	50-55	High	High	Low.
14:								
Dawson	---	>80	---	0-9	15-19	High	High	High.
Loxley	---	>80	---	6-18	50-55	High	High	High.
15A:								
Croswell	---	>80	---	---	---	Low	Low	Moderate.
Au Gres	---	>80	---	---	---	Moderate	Low	Moderate.
16B:								
Graycalm	---	>80	---	---	---	Low	Low	Moderate.
17A:								
Croswell	---	>80	---	---	---	Low	Low	Moderate.
18A:								
Au Gres	---	>80	---	---	---	Moderate	Low	Moderate.
20B:								
Graycalm	---	>80	---	---	---	Low	Low	Moderate.
Grayling	---	>80	---	---	---	Low	Low	Moderate.
20D:								
Graycalm	---	>80	---	---	---	Low	Low	Moderate.
Grayling	---	>80	---	---	---	Low	Low	Moderate.
20F:								
Graycalm	---	>80	---	---	---	Low	Low	Moderate.
Grayling	---	>80	---	---	---	Low	Low	Moderate.
23:								
Ausable	---	>80	---	0-4	4-9	Moderate	High	Low.
Bowstring	---	>80	---	6-20	20-34	High	High	Low.
24A:								
Kinross	---	>80	---	---	---	Moderate	High	Moderate.
Au Gres	---	>80	---	---	---	Moderate	Low	Moderate.
26B:								
Cublake	---	>80	---	---	---	Low	Low	Moderate.
34B:								
Kneff	---	>80	---	---	---	High	Moderate	Low.
35:								
Kinross	---	>80	---	---	---	Moderate	High	Moderate.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Initial	Total		Uncoated steel	Concrete
		In	In	In	In			
47D:								
Graycalm	---	>80	---	---	---	Low	Low	Moderate.
47F:								
Graycalm	---	>80	---	---	---	Low	Low	Moderate.
50B:								
Au Gres	---	>80	---	---	---	Moderate	Low	Moderate.
Kinross	---	>80	---	---	---	Moderate	High	Moderate.
Croswell	---	>80	---	---	---	Low	Low	Moderate.
51:								
Tawas	---	>80	---	4-12	12-24	High	High	Moderate.
Leafriver	---	>80	---	0-5	5-10	High	High	High.
57B:								
Kawkawlin	---	>80	---	---	---	High	High	Low.
58A:								
Wakeley	---	>80	---	---	---	Moderate	High	Moderate.
Allendale	---	>80	---	---	---	Moderate	High	Moderate.
67A:								
Bowers	---	>80	---	---	---	High	High	Low.
Deerheart	---	>80	---	---	---	High	High	Low.
75B:								
Rubicon	---	>80	---	---	---	Low	Low	High.
75D:								
Rubicon	---	>80	---	---	---	Low	Low	High.
78.								
Pits								
81B:								
Grayling	---	>80	---	---	---	Low	Low	Moderate.
81D:								
Grayling	---	>80	---	---	---	Low	Low	Moderate.
81F:								
Grayling	---	>80	---	---	---	Low	Low	Moderate.
82B.								
Udorthents								
83B:								
Udipsamments	---	>80	---	---	---	Low	Low	Moderate.
83F:								
Udipsamments	---	>80	---	---	---	Low	Low	Moderate.
86:								
Histosols	---	>80	---	0-12	12-24	High	---	---
Aquents	---	>80	---	---	---	High	---	---

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Subsidence: Initial	Subsidence: Total	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In	In	In			
87:								
Ausable	---	>80	---	---	---	Moderate	High	Low.
90B:								
Chinwhisker	---	>80	---	---	---	Low	Low	Moderate.
102D:								
Curtisville	---	>80	---	---	---	Moderate	Moderate	Moderate.
103B:								
Nester	---	>80	---	---	---	Moderate	High	Low.
103C:								
Nester	---	>80	---	---	---	Moderate	High	Low.
114A:								
Ingalls	---	>80	---	---	---	Moderate	Moderate	Moderate.
120B:								
Morganlake	---	>80	---	---	---	Low	Low	Moderate.
120C:								
Morganlake	---	>80	---	---	---	Low	Low	Moderate.
123D:								
Klacking	---	>80	---	---	---	Low	Low	Moderate.
144B:								
Perecheney	---	>80	---	---	---	Low	Moderate	Moderate.
144C:								
Perecheney	---	>80	---	---	---	Low	Moderate	Moderate.
159A:								
Finch	Ortstein	10-16	0-3	---	---	Moderate	High	Moderate.
307B:								
Klacking	---	>80	---	---	---	Low	Low	Moderate.
307E:								
Klacking	---	>80	---	---	---	Low	Low	Moderate.
360:								
Wakeley	---	>80	---	---	---	Moderate	High	Moderate.
368A:								
Au Gres	---	>80	---	---	---	Moderate	Low	Moderate.
Deford	---	>80	---	---	---	Moderate	Low	Moderate.
369:								
Deford	---	>80	---	---	---	Moderate	Low	Moderate.
380.								
Access denied								
382B:								
Proper	---	>80	---	---	---	Low	Low	Moderate.
408:								
Sims	---	>80	---	---	---	High	High	Low.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Initial	Total		Uncoated steel	Concrete
		In	In	In	In			
410B:								
Proper	---	>80	---	---	---	Low	Low	Moderate.
Finch	Ortstein	10-16	0-3	---	---	Moderate	High	Moderate.
Deford	---	>80	---	---	---	Moderate	Low	Moderate.
429D:								
Menominee	---	>80	---	---	---	Low	Low	Moderate.
441B:								
Morganlake	---	>80	---	---	---	Low	Low	Moderate.
Nester	---	>80	---	---	---	Moderate	High	Low.
441C:								
Morganlake	---	>80	---	---	---	Low	Low	Moderate.
Nester	---	>80	---	---	---	Moderate	High	Low.
442D:								
Menominee	---	>80	---	---	---	Low	Low	Moderate.
Curtisville	---	>80	---	---	---	Moderate	Moderate	Moderate.
473:								
Deford	---	>80	---	---	---	Moderate	Low	Moderate.
Kinross	---	>80	---	---	---	Moderate	High	Moderate.
474:								
Histosols	---	>80	---	0-12	12-24	High	---	---
Fluvaquents.								
475B:								
Graycalm	---	>80	---	---	---	Low	Low	Moderate.
Klacking	---	>80	---	---	---	Low	Low	Moderate.
475D:								
Graycalm	---	>80	---	---	---	Low	Low	Moderate.
Klacking	---	>80	---	---	---	Low	Low	Moderate.
475E:								
Graycalm	---	>80	---	---	---	Low	Low	Moderate.
Klacking	---	>80	---	---	---	Low	Low	Moderate.
476B:								
Klacking	---	>80	---	---	---	Low	Low	Moderate.
Perecheney	---	>80	---	---	---	Low	Moderate	Moderate.
476D:								
Klacking	---	>80	---	---	---	Low	Low	Moderate.
Perecheney	---	>80	---	---	---	Low	Moderate	Moderate.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Subsidence: Initial	Subsidence: Total	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In	In	In			
490:								
Urban land.								
Aquents	---	>80	---	---	---	High	---	---
491A:								
Geels	---	>80	---	---	---	Low	High	Moderate.
492A:								
Allendale, sandy substratum	---	>80	---	---	---	Moderate	High	High.
493A:								
Otisco	---	>80	---	---	---	Moderate	Low	Moderate.
495B:								
Gerrish	---	>80	---	---	---	Low	Low	High.
495D:								
Gerrish	---	>80	---	---	---	Low	Low	High.
495F:								
Gerrish	---	>80	---	---	---	Low	Low	High.
496B:								
Gerrish	---	>80	---	---	---	Low	Low	High.
Grayling	---	>80	---	---	---	Low	Low	Moderate.
496D:								
Gerrish	---	>80	---	---	---	Low	Low	High.
Grayling	---	>80	---	---	---	Low	Low	Moderate.
496F:								
Gerrish	---	>80	---	---	---	Low	Low	High.
Grayling	---	>80	---	---	---	Low	Low	Moderate.
497A:								
Debolt	---	>80	---	---	---	Moderate	High	Moderate.
498A:								
Pinewood	---	>80	---	---	---	High	High	Moderate.
499:								
Dawson	---	>80	---	---	30-36	High	High	High.
Kinross	---	>80	---	---	---	Moderate	High	Moderate.
500A:								
Flink	---	>80	---	---	---	Moderate	Moderate	High.
501B:								
Kellogg, sandy substratum	---	>80	---	---	---	Low	High	Moderate.

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Initial	Total		Uncoated steel	Concrete
		In	In	In	In			
502B:								
Kawkawlin----------	---	>80	---	---	---	High--------	High--------	Low.
Sims---------------	---	>80	---	---	---	High--------	High--------	Low.

Table 21.--Soil Moisture Status by Depth

(Depths of layers are in feet. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
13:												
Tawas	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
Lupton	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
14:												
Dawson	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
Loxley	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
15A:												
Croswell	0.0-5.0: Moist 5.0-6.5: Wet	0.0-5.0: Moist 5.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-3.5: Moist 3.5-6.5: Wet	0.0-2.0: Dry 2.0-6.5: Moist	0.0-3.0: Dry 3.0-6.5: Moist	0.0-4.5: Moist 4.5-6.5: Wet	0.0-3.0: Moist 3.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet
Au Gres	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Dry 1.0-3.0: Moist 3.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---
16B:												
Graycalm	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
17A:												
Croswell--------	0.0-5.0: Moist 5.0-6.5: Wet	0.0-5.0: Moist 5.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-3.5: Moist 3.5-6.5: Wet	0.0-2.0: Dry 2.0-6.5: Moist	0.0-3.0: Dry 3.0-6.5: Moist	0.0-4.5: Moist 4.5-6.5: Wet	0.0-3.0: Moist 3.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet
18A:												
Au Gres---------	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Dry 1.0-3.0: Moist 3.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---
20B:												
Graycalm--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
Grayling--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
20D:												
Graycalm--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
Grayling--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
20F:												
Graycalm--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
Grayling--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
23:												
Ausable---------	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
Bowstring-------	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
24A:												
Kinross---------	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
Au Gres---------	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Dry 1.0-3.0: Moist 3.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---
26B:												
Cublake---------	0.0-5.0: Moist 5.0-6.5: Wet	0.0-5.0: Moist 5.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-3.4: Moist 3.4-6.5: Wet	0.0-2.0: Dry 2.0-6.5: Moist	0.0-3.0: Dry 3.0-6.5: Moist	0.0-4.5: Moist 4.5-6.5: Wet	0.0-3.0: Moist 3.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet
34B:												
Kneff-----------	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist
35:												
Kinross---------	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
47D:												
Graycalm--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
47F:												
Graycalm--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
50B:												
Au Gres---------	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Dry 1.0-3.0: Moist 3.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---
Kinross---------	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
Croswell--------	0.0-5.0: Moist 5.0-6.5: Wet	0.0-5.0: Moist 5.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-3.5: Moist 3.5-6.5: Wet	0.0-2.0: Dry 2.0-6.5: Moist	0.0-3.0: Dry 3.0-6.5: Moist	0.0-4.5: Moist 4.5-6.5: Wet	0.0-3.0: Moist 3.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet
51:												
Tawas-----------	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
Leafriver-------	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
57B:												
Kawkawlin-------	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-0.5: Moist 0.5-2.0: Wet 2.0-6.5: Moist	0.0-0.5: Moist 0.5-2.0: Wet 2.0-6.5: Moist	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-0.5: Dry 0.5-6.5: Moist ---	0.0-6.5: Moist --- ---	0.0-0.5: Moist 0.5-2.0: Wet 2.0-6.5: Moist	0.0-1.0: Moist 1.0-1.5: Wet 1.5-6.5: Moist	0.0-1.0: Moist 1.0-1.5: Wet 1.5-6.5: Moist
58A:												
Wakeley---------	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-0.5: Moist 0.5-2.0: Wet 2.0-6.5: Moist	0.0-0.5: Moist 0.5-2.0: Wet 2.0-6.5: Moist	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---
Allendale-------	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-0.5: Moist 0.5-3.0: Wet 3.0-6.5: Moist	0.0-0.5: Moist 0.5-3.0: Wet 3.0-6.5: Moist	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-6.5: Moist --- ---	0.0-0.5: Dry 0.5-6.5: Moist ---	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-6.5: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-6.5: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-6.5: Moist
67A:												
Bowers----------	0.0-1.0: Moist 1.0-1.5: Wet 1.5-6.5: Moist	0.0-1.0: Moist 1.0-1.5: Wet 1.5-6.5: Moist	0.0-1.0: Moist 1.0-1.5: Wet 1.5-6.5: Moist	0.0-0.5: Moist 0.5-1.5: Wet 1.5-6.5: Moist	0.0-0.5: Moist 0.5-1.5: Wet 1.5-6.5: Moist	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-0.5: Dry 0.5-6.5: Moist ---	0.0-6.5: Moist --- ---	0.0-1.0: Moist 1.0-1.5: Wet 1.5-6.5: Moist	0.0-1.0: Moist 1.0-1.5: Wet 1.5-6.5: Moist	0.0-1.0: Moist 1.0-1.5: Wet 1.5-6.5: Moist
Deerheart-------	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-2.0: Wet 2.0-6.5: Moist	0.0-2.0: Wet 2.0-6.5: Moist	0.0-2.0: Wet 2.0-6.5: Moist	0.0-2.0: Wet 2.0-6.5: Moist	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
75B:												
Rubicon---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
75D:												
Rubicon---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
78.												
Pits												
81B:												
Grayling--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
81D:												
Grayling--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
81F:												
Grayling--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
82B:												
Udorthents------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
83B:												
Udipsamments----	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
83F:												
Udipsamments----	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
86:												
Histosols-------	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet
Aquents---------	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet
87:												
Ausable---------	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-0.5: Moist	0.0-0.5: Moist	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet
	---	---	---	---	---	---	0.5-6.5: Wet	0.5-6.5: Wet	---	---	---	---
90B:												
Chinwhisker-----	0.0-5.0: Moist	0.0-5.0: Moist	0.0-2.5: Moist	0.0-2.0: Moist	0.0-2.0: Moist	0.0-3.5: Moist	0.0-2.0: Dry	0.0-3.0: Dry	0.0-4.5: Moist	0.0-3.0: Moist	0.0-2.5: Moist	0.0-2.0: Moist
	5.0-6.5: Wet	5.0-6.5: Wet	2.5-6.5: Wet	2.0-6.5: Wet	2.0-6.5: Wet	3.5-6.5: Wet	2.0-6.5: Moist	3.0-6.5: Moist	4.5-6.5: Wet	3.0-6.5: Wet	2.5-6.5: Wet	2.0-6.5: Wet
102D:												
Curtisville-----	0.0-6.5: Moist	0.0-6.5: Moist	0.0-6.5: Moist	0.0-6.5: Moist	0.0-6.5: Moist	0.0-6.5: Moist	0.0-1.0: Dry	0.0-1.0: Dry	0.0-6.5: Moist	0.0-6.5: Moist	0.0-6.5: Moist	0.0-6.5: Moist
	---	---	---	---	---	---	1.0-6.5: Moist	1.0-6.5: Moist	---	---	---	---
103B:												
Nester----------	0.0-6.5: Moist	0.0-6.5: Moist	0.0-2.5: Moist	0.0-2.5: Moist	0.0-2.5: Moist	0.0-6.5: Moist	0.0-1.0: Dry	0.0-6.5: Moist	0.0-6.5: Moist	0.0-2.5: Moist	0.0-2.5: Moist	0.0-6.5: Moist
	---	---	2.5-3.5: Wet	2.5-3.5: Wet	2.5-3.5: Wet	---	1.0-6.5: Moist	---	---	2.5-3.5: Wet	2.5-3.0: Wet	---
	---	---	3.5-6.5: Moist	3.5-6.5: Moist	3.5-6.5: Moist	---	---	---	---	3.5-6.5: Moist	3.0-6.5: Moist	---
103C:												
Nester----------	0.0-6.5: Moist	0.0-6.5: Moist	0.0-2.5: Moist	0.0-2.5: Moist	0.0-2.5: Moist	0.0-6.5: Moist	0.0-1.0: Dry	0.0-6.5: Moist	0.0-6.5: Moist	0.0-2.5: Moist	0.0-2.5: Moist	0.0-6.5: Moist
	---	---	2.5-3.5: Wet	2.5-3.5: Wet	2.5-3.5: Wet	---	1.0-6.5: Moist	---	---	2.5-3.5: Wet	2.5-3.5: Wet	---
	---	---	3.5-6.5: Moist	3.5-6.5: Moist	3.5-6.5: Moist	---	---	---	---	3.5-6.5: Moist	3.5-6.5: Moist	---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
114A: Ingalls---------	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet 1.5-6.5: Moist	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---
120B: Morganlake------	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist ---	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---
120C: Morganlake------	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist ---	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---
123D: Klacking--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
144B: Perecheney------	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-6.5: Moist --- ---	0.0-2.5: Dry 2.5-6.5: Moist ---	0.0-2.5: Dry 2.5-6.5: Moist ---	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist
144C: Perecheney------	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-6.5: Moist --- ---	0.0-2.5: Dry 2.5-6.5: Moist ---	0.0-2.5: Dry 2.5-6.5: Moist ---	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
159A:												
Finch-----------	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Dry 1.0-3.0: Moist 3.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---
307B:												
Klacking--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
307E:												
Klacking--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
360:												
Wakeley---------	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-0.5: Moist 0.5-2.0: Wet 2.0-6.5: Moist	0.0-0.5: Moist 0.5-2.0: Wet 2.0-6.5: Moist	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---	0.0-2.0: Wet 2.0-6.5: Moist ---
368A:												
Au Gres---------	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Dry 1.0-3.0: Moist 3.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---
Deford----------	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-1.5: Moist 1.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-1.0: Moist 1.0-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
369:												
Deford----------	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-1.5: Moist 1.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-1.0: Moist 1.0-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
380. Access denied												
382B: Proper----------	0.0-5.0: Moist 5.0-6.5: Wet	0.0-5.0: Moist 5.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-3.5: Moist 3.5-6.5: Wet	0.0-2.0: Dry 2.0-6.5: Moist	0.0-3.0: Dry 3.0-6.5: Moist	0.0-4.5: Moist 4.5-6.5: Wet	0.0-3.0: Moist 3.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet
408: Sims------------	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.0: Wet 1.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-1.0: Wet 1.0-6.5: Moist	0.0-1.0: Wet 1.0-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist
410B: Proper----------	0.0-5.0: Moist 5.0-6.5: Wet	0.0-5.0: Moist 5.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-3.5: Moist 3.5-6.5: Wet	0.0-2.0: Dry 2.0-6.5: Moist	0.0-3.0: Dry 3.0-6.5: Moist	0.0-4.5: Moist 4.5-6.5: Wet	0.0-3.0: Moist 3.0-6.5: Wet	0.0-2.5: Moist 2.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet
Finch-----------	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Dry 1.0-3.0: Moist 3.0-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.0: Moist 1.0-6.5: Wet ---	0.0-1.5: Moist 1.5-6.5: Wet ---
Deford----------	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-1.5: Moist 1.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-1.0: Moist 1.0-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
429D: Menominee-------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-3.0: Dry 3.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
441B: Morganlake------	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist ---	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
441B:												
Nester	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-6.5: Moist --- ---	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---
441C:												
Morganlake	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist ---	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-2.0: Moist 2.0-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---
Nester	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-6.5: Moist --- ---	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist	0.0-6.5: Moist --- ---
442D:												
Menominee	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-3.0: Dry 3.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
Curtisville	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-1.0: Dry 1.0-6.5: Moist	0.0-1.0: Dry 1.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
473:												
Deford	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-1.5: Moist 1.5-6.5: Wet	0.0-2.0: Moist 2.0-6.5: Wet	0.0-1.0: Moist 1.0-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
Kinross	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
474:												
Histosols--------	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet
Fluvaquents------	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet
475B:												
Graycalm---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
Klacking---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
475D:												
Graycalm---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
Klacking---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
475E:												
Graycalm---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
Klacking---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
476B:												
Klacking---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
476B:												
Perecheney------	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-6.5: Moist --- ---	0.0-2.5: Dry 2.5-6.5: Moist ---	0.0-2.5: Dry 2.5-6.5: Moist ---	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist
476D:												
Klacking--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
Perecheney------	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-6.5: Moist --- ---	0.0-2.5: Dry 2.5-6.5: Moist ---	0.0-2.5: Dry 2.5-6.5: Moist ---	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist	0.0-2.5: Moist 2.5-6.0: Wet 6.0-6.5: Moist
490:												
Urban land.												
Aquents---------	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet	0.0-6.5: Wet
491A:												
Geels-----------	0.0-2.5: Moist 2.5-5.0: Wet 5.0-6.5: Moist	0.0-2.5: Moist 2.5-5.0: Wet 5.0-6.5: Moist	0.0-2.5: Moist 2.5-5.0: Wet 5.0-6.5: Moist	0.0-2.5: Moist 2.5-5.0: Wet 5.0-6.5: Moist	0.0-2.5: Moist 2.5-5.0: Wet 5.0-6.5: Moist	0.0-6.5: Moist --- ---	0.0-2.5: Dry 2.5-6.5: Moist ---	0.0-2.5: Dry 2.5-6.5: Moist ---	0.0-2.5: Moist 2.5-5.0: Wet 5.0-6.5: Moist	0.0-2.5: Moist 2.5-5.0: Wet 5.0-6.5: Moist	0.0-2.5: Moist 2.5-5.0: Wet 5.0-6.5: Moist	0.0-2.5: Moist 2.5-5.0: Wet 5.0-6.5: Moist
492A:												
Allendale, sandy substratum-----	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-0.5: Moist 0.5-3.0: Wet 3.0-6.5: Moist	0.0-0.5: Moist 0.5-3.0: Wet 3.0-6.5: Moist	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist	0.0-1.0: Moist 1.0-3.0: Wet 3.0-6.5: Moist

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
493A:												
Otisco----------	0.0-1.0: Moist 1.0-6.5: Wet	0.0-1.0: Moist 1.0-6.5: Wet	0.0-1.0: Moist 1.0-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-1.0: Moist 1.0-6.5: Wet	0.0-1.0: Dry 1.0-6.5: Moist	0.0-1.0: Dry 1.0-6.5: Moist	0.0-1.0: Moist 1.0-6.5: Wet	0.0-1.0: Moist 1.0-6.5: Wet	0.0-1.0: Moist 1.0-6.5: Wet	0.0-1.0: Moist 1.0-6.5: Wet
495B:												
Gerrish---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
495D:												
Gerrish---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
495F:												
Gerrish---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
496B:												
Gerrish---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
Grayling--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
496D:												
Gerrish---------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
Grayling--------	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
496F:												
Gerrish	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
Grayling	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist	0.0-2.0: Dry 2.0-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-6.5: Moist ---
497A:												
Debolt	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist ---	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist ---	0.0-1.5: Moist 1.5-3.0: Wet 3.0-3.5: Moist 3.5-6.5: Wet	0.0-1.5: Moist 1.5-3.0: Wet 3.0-3.5: Moist 3.5-6.5: Wet	0.0-1.5: Moist 1.5-3.0: Wet 3.0-3.5: Moist 3.5-6.5: Wet	0.0-3.5: Moist 3.5-6.5: Wet --- ---	0.0-1.0: Dry 1.0-6.5: Moist --- ---	0.0-1.0: Dry 1.0-6.5: Moist --- ---	0.0-6.5: Moist --- --- ---	0.0-1.5: Moist 1.5-3.0: Wet 3.0-3.5: Moist 3.5-6.5: Wet	0.0-1.5: Moist 1.5-3.0: Wet 3.0-3.5: Moist 3.5-6.5: Wet	0.0-2.5: Moist 2.5-3.5: Wet 3.5-6.5: Moist ---
498A:												
Pinewood	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist
499:												
Dawson	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---
Kinross	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-0.5: Moist 0.5-6.5: Wet	0.0-0.5: Moist 0.5-6.5: Wet	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---	0.0-6.5: Wet ---

Table 21.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
500A:												
Flink-----------	0.0-1.0: Moist 1.0-4.0: Wet 4.0-6.5: Moist	0.0-1.0: Moist 1.0-4.0: Wet 4.0-6.5: Moist	0.0-0.5: Moist 0.5-4.0: Wet 4.0-6.5: Moist	0.0-0.5: Moist 0.5-4.0: Wet 4.0-6.5: Moist	0.0-0.5: Moist 0.5-4.0: Wet 4.0-6.5: Moist	0.0-1.0: Moist 1.0-4.0: Wet 4.0-6.5: Moist	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-1.0: Dry 1.0-6.5: Moist ---	0.0-1.0: Moist 1.0-4.0: Wet 4.0-6.5: Moist	0.0-1.0: Moist 1.0-4.0: Wet 4.0-6.5: Moist	0.0-1.0: Moist 1.0-4.0: Wet 4.0-6.5: Moist	0.0-1.0: Moist 1.0-4.0: Wet 4.0-6.5: Moist
501B:												
Kellogg, sandy substratum-----	0.0-2.0: Moist 2.0-5.0: Wet 5.0-6.5: Moist	0.0-2.0: Moist 2.0-5.0: Wet 5.0-6.5: Moist	0.0-2.0: Moist 2.0-5.0: Wet 5.0-6.5: Moist	0.0-2.0: Moist 2.0-5.0: Wet 5.0-6.5: Moist	0.0-2.0: Moist 2.0-5.0: Wet 5.0-6.5: Moist	0.0-6.5: Moist --- ---	0.0-2.0: Dry 2.0-6.5: Moist ---	0.0-2.0: Dry 2.0-6.5: Moist ---	0.0-6.5: Moist --- ---	0.0-2.0: Moist 2.0-5.0: Wet 5.0-6.5: Moist	0.0-2.0: Moist 2.0-5.0: Wet 5.0-6.5: Moist	0.0-2.0: Moist 2.0-5.0: Wet 5.0-6.5: Moist
502B:												
Kawkawlin-------	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-0.5: Moist 0.5-2.0: Wet 2.0-6.5: Moist	0.0-0.5: Moist 0.5-2.0: Wet 2.0-6.5: Moist	0.0-6.5: Moist --- ---	0.0-6.5: Moist --- ---	0.0-0.5: Dry 0.5-6.5: Moist ---	0.0-6.5: Moist --- ---	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist	0.0-1.0: Moist 1.0-2.0: Wet 2.0-6.5: Moist
Sims------------	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-6.5: Moist ---	0.0-6.5: Moist ---	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist	0.0-1.5: Wet 1.5-6.5: Moist

Table 22.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydro-logic group	Month	Water table			Ponding			Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
13:										
Tawas-----------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
Lupton----------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
14:										
Dawson----------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
Loxley----------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
15A:										
Croswell--------	A									
		January	5.0	>6.0	Apparent	---	---	---	---	---
		February	5.0	>6.0	Apparent	---	---	---	---	---
		March	2.5	>6.0	Apparent	---	---	---	---	---
		April	2.0	>6.0	Apparent	---	---	---	---	---
		May	2.0	>6.0	Apparent	---	---	---	---	---
		June	3.5	>6.0	Apparent	---	---	---	---	---
		September	4.5	>6.0	Apparent	---	---	---	---	---
		October	3.0	>6.0	Apparent	---	---	---	---	---
		November	2.5	>6.0	Apparent	---	---	---	---	---
		December	2.0	>6.0	Apparent	---	---	---	---	---
Au Gres---------	B									
		January	1.5	>6.0	Apparent	---	---	---	---	---
		February	1.5	>6.0	Apparent	---	---	---	---	---
		March	1.0	>6.0	Apparent	---	---	---	---	---
		April	0.5	>6.0	Apparent	---	---	---	---	---
		May	0.5	>6.0	Apparent	---	---	---	---	---
		June	1.0	>6.0	Apparent	---	---	---	---	---
		July	2.0	>6.0	Apparent	---	---	---	---	---
		August	3.0	>6.0	Apparent	---	---	---	---	---
		September	2.0	>6.0	Apparent	---	---	---	---	---
		October	1.0	>6.0	Apparent	---	---	---	---	---
		November	1.0	>6.0	Apparent	---	---	---	---	---
		December	1.5	>6.0	Apparent	---	---	---	---	---
16B:										
Graycalm--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
17A:										
Croswell--------	A									
		January	5.0	>6.0	Apparent	---	---	---	---	---
		February	5.0	>6.0	Apparent	---	---	---	---	---
		March	2.5	>6.0	Apparent	---	---	---	---	---
		April	2.0	>6.0	Apparent	---	---	---	---	---
		May	2.0	>6.0	Apparent	---	---	---	---	---
		June	3.5	>6.0	Apparent	---	---	---	---	---
		September	4.5	>6.0	Apparent	---	---	---	---	---
		October	3.0	>6.0	Apparent	---	---	---	---	---
		November	2.5	>6.0	Apparent	---	---	---	---	---
		December	2.0	>6.0	Apparent	---	---	---	---	---
18A:										
Au Gres---------	B									
		January	1.5	>6.0	Apparent	---	---	---	---	---
		February	1.5	>6.0	Apparent	---	---	---	---	---
		March	1.0	>6.0	Apparent	---	---	---	---	---
		April	0.5	>6.0	Apparent	---	---	---	---	---
		May	0.5	>6.0	Apparent	---	---	---	---	---
		June	1.0	>6.0	Apparent	---	---	---	---	---
		July	2.0	>6.0	Apparent	---	---	---	---	---
		August	3.0	>6.0	Apparent	---	---	---	---	---
		September	2.0	>6.0	Apparent	---	---	---	---	---
		October	1.0	>6.0	Apparent	---	---	---	---	---
		November	1.0	>6.0	Apparent	---	---	---	---	---
		December	1.5	>6.0	Apparent	---	---	---	---	---

Table 22.--Water Features--Continued

			Water table			Ponding			Flooding	
Map symbol and soil name	Hydro-logic group	Month	Upper limit	Lower limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
20B:										
Graycalm--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Grayling--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
20D:										
Graycalm--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Grayling--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
20F:										
Graycalm--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Grayling--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
23:										
Ausable---------	D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
Bowstring-------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
24A:										
Kinross---------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
Au Gres---------	B									
		January	1.5	>6.0	Apparent	---	---	---	---	---
		February	1.5	>6.0	Apparent	---	---	---	---	---
		March	1.0	>6.0	Apparent	---	---	---	---	---
		April	0.5	>6.0	Apparent	---	---	---	---	---
		May	0.5	>6.0	Apparent	---	---	---	---	---
		June	1.0	>6.0	Apparent	---	---	---	---	---
		July	2.0	>6.0	Apparent	---	---	---	---	---
		August	3.0	>6.0	Apparent	---	---	---	---	---
		September	2.0	>6.0	Apparent	---	---	---	---	---
		October	1.0	>6.0	Apparent	---	---	---	---	---
		November	1.0	>6.0	Apparent	---	---	---	---	---
		December	1.5	>6.0	Apparent	---	---	---	---	---
26B:										
Cublake---------	A									
		January	5.0	>6.0	Apparent	---	---	---	---	---
		February	5.0	>6.0	Apparent	---	---	---	---	---
		March	2.5	>6.0	Apparent	---	---	---	---	---
		April	2.0	>6.0	Apparent	---	---	---	---	---
		May	2.0	>6.0	Apparent	---	---	---	---	---
		June	3.4	>6.0	Apparent	---	---	---	---	---
		September	4.5	>6.0	Apparent	---	---	---	---	---
		October	3.0	>6.0	Apparent	---	---	---	---	---
		November	2.5	>6.0	Apparent	---	---	---	---	---
		December	2.0	>6.0	Apparent	---	---	---	---	---
34B:										
Kneff-----------	C									
		January	2.0	3.5	Perched	---	---	---	---	---
		February	2.0	3.5	Perched	---	---	---	---	---
		March	2.0	3.5	Perched	---	---	---	---	---
		April	2.0	3.5	Perched	---	---	---	---	---
		May	2.0	3.5	Perched	---	---	---	---	---
		October	2.0	3.5	Perched	---	---	---	---	---
		November	2.0	3.5	Perched	---	---	---	---	---
		December	2.0	3.5	Perched	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
35:										
Kinross---------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
47D:										
Graycalm--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
47F:										
Graycalm--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
50B:										
Au Gres---------	B									
		January	1.5	>6.0	Apparent	---	---	---	---	---
		February	1.5	>6.0	Apparent	---	---	---	---	---
		March	1.0	>6.0	Apparent	---	---	---	---	---
		April	0.5	>6.0	Apparent	---	---	---	---	---
		May	0.5	>6.0	Apparent	---	---	---	---	---
		June	1.0	>6.0	Apparent	---	---	---	---	---
		July	2.0	>6.0	Apparent	---	---	---	---	---
		August	3.0	>6.0	Apparent	---	---	---	---	---
		September	2.0	>6.0	Apparent	---	---	---	---	---
		October	1.0	>6.0	Apparent	---	---	---	---	---
		November	1.0	>6.0	Apparent	---	---	---	---	---
		December	1.5	>6.0	Apparent	---	---	---	---	---
Kinross---------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
50B:										
Croswell--------	A									
		January	5.0	>6.0	Apparent	---	---	---	---	---
		February	5.0	>6.0	Apparent	---	---	---	---	---
		March	2.5	>6.0	Apparent	---	---	---	---	---
		April	2.0	>6.0	Apparent	---	---	---	---	---
		May	2.0	>6.0	Apparent	---	---	---	---	---
		June	3.5	>6.0	Apparent	---	---	---	---	---
		September	4.5	>6.0	Apparent	---	---	---	---	---
		October	3.0	>6.0	Apparent	---	---	---	---	---
		November	2.5	>6.0	Apparent	---	---	---	---	---
		December	2.0	>6.0	Apparent	---	---	---	---	---
51:										
Tawas-----------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
Leafriver-------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
57B:										
Kawkawlin-------	C									
		January	1.0	2.0	Perched	---	---	---	---	---
		February	1.0	2.0	Perched	---	---	---	---	---
		March	1.0	2.0	Perched	---	---	---	---	---
		April	0.5	2.0	Perched	---	---	---	---	---
		May	0.5	2.0	Perched	---	---	---	---	---
		October	0.5	2.0	Perched	---	---	---	---	---
		November	1.0	1.5	Perched	---	---	---	---	---
		December	1.0	1.5	Perched	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
58A:										
Wakeley---------	D									
		January	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		February	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		March	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		April	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		May	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		June	0.0	2.0	Perched	---	---	---	---	---
		July	0.5	2.0	Perched	---	---	---	---	---
		August	0.5	2.0	Perched	---	---	---	---	---
		September	0.0	2.0	Perched	---	---	---	---	---
		October	0.0	2.0	Perched	---	---	---	---	---
		November	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		December	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
Allendale-------	C									
		January	1.0	3.0	Perched	---	---	---	---	---
		February	1.0	3.0	Perched	---	---	---	---	---
		March	1.0	3.0	Perched	---	---	---	---	---
		April	0.5	3.0	Perched	---	---	---	---	---
		May	0.5	3.0	Perched	---	---	---	---	---
		June	1.0	3.0	Perched	---	---	---	---	---
		September	1.0	3.0	Perched	---	---	---	---	---
		October	1.0	2.5	Perched	---	---	---	---	---
		November	1.0	2.5	Perched	---	---	---	---	---
		December	1.0	2.5	Perched	---	---	---	---	---
67A:										
Bowers----------	C									
		January	1.0	1.5	Perched	---	---	---	---	---
		February	1.0	1.5	Perched	---	---	---	---	---
		March	1.0	1.5	Perched	---	---	---	---	---
		April	0.5	1.5	Perched	---	---	---	---	---
		May	0.5	1.5	Perched	---	---	---	---	---
		October	1.0	1.5	Perched	---	---	---	---	---
		November	1.0	1.5	Perched	---	---	---	---	---
		December	1.0	1.5	Perched	---	---	---	---	---
Deerheart-------	C									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		June	0.0	2.0	Perched	---	---	---	---	---
		July	0.0	2.0	Perched	---	---	---	---	---
		August	0.0	2.0	Perched	---	---	---	---	---
		September	0.0	2.0	Perched	---	---	---	---	---
		October	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
75B:										
Rubicon---------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
75D:										
Rubicon---------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
78.										
Pits										
81B:										
Grayling--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
81D:										
Grayling--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
81F:										
Grayling--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
82B:										
Udorthents------	---									
		All months	>6.0	>6.0	---	---	---	---	---	---
83B:										
Udipsamments----	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
83F:										
Udipsamments----	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
86:										
Histosols-------	D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		June	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		July	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		August	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		September	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		October	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
Aquents---------	D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		June	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		July	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		August	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		September	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		October	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
87:										
Ausable----------	D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	Long	Frequent.
90B:										
Chinwhisker-----	A									
		January	5.0	>6.0	Apparent	---	---	---	---	---
		February	5.0	>6.0	Apparent	---	---	---	---	---
		March	2.5	>6.0	Apparent	---	---	---	---	---
		April	2.0	>6.0	Apparent	---	---	---	---	---
		May	2.0	>6.0	Apparent	---	---	---	---	---
		June	3.5	>6.0	Apparent	---	---	---	---	---
		September	4.5	>6.0	Apparent	---	---	---	---	---
		October	3.0	>6.0	Apparent	---	---	---	---	---
		November	2.5	>6.0	Apparent	---	---	---	---	---
		December	2.0	>6.0	Apparent	---	---	---	---	---
102D:										
Curtisville-----	D									
		All months	>6.0	>6.0	---	---	---	---	---	---
103B:										
Nester----------	C									
		March	2.5	3.5	Perched	---	---	---	---	---
		April	2.5	3.5	Perched	---	---	---	---	---
		May	2.5	3.5	Perched	---	---	---	---	---
		October	2.5	3.5	Perched	---	---	---	---	---
		November	2.5	3.0	Perched	---	---	---	---	---
103C:										
Nester----------	C									
		March	2.5	3.5	Perched	---	---	---	---	---
		April	2.5	3.5	Perched	---	---	---	---	---
		May	2.5	3.5	Perched	---	---	---	---	---
		October	2.5	3.5	Perched	---	---	---	---	---
		November	2.5	3.5	Perched	---	---	---	---	---
114A:										
Ingalls---------	B									
		January	1.0	>6.0	Apparent	---	---	---	---	---
		February	1.0	>6.0	Apparent	---	---	---	---	---
		March	1.0	>6.0	Apparent	---	---	---	---	---
		April	0.5	>6.0	Apparent	---	---	---	---	---
		May	0.5	>6.0	Apparent	---	---	---	---	---
		June	1.0	>6.0	Apparent	---	---	---	---	---
		September	1.0	>6.0	Apparent	---	---	---	---	---
		October	1.0	>6.0	Apparent	---	---	---	---	---
		November	1.0	>6.0	Apparent	---	---	---	---	---
		December	1.0	>6.0	Apparent	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
120B:										
Morganlake------	B									
		March	2.0	3.5	Perched	---	---	---	---	---
		April	2.0	3.5	Perched	---	---	---	---	---
		May	2.0	3.5	Perched	---	---	---	---	---
		September	2.0	3.5	Perched	---	---	---	---	---
		October	2.0	3.5	Perched	---	---	---	---	---
		November	2.0	3.5	Perched	---	---	---	---	---
120C:										
Morganlake------	B									
		March	2.0	3.5	Perched	---	---	---	---	---
		April	2.0	3.5	Perched	---	---	---	---	---
		May	2.0	3.5	Perched	---	---	---	---	---
		September	2.0	3.5	Perched	---	---	---	---	---
		October	2.0	3.5	Perched	---	---	---	---	---
		November	2.0	3.5	Perched	---	---	---	---	---
123D:										
Klacking--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
144B:										
Perecheney------	B									
		January	2.5	>6.0	Apparent	---	---	---	---	---
		February	2.5	>6.0	Apparent	---	---	---	---	---
		March	2.5	>6.0	Apparent	---	---	---	---	---
		April	2.5	>6.0	Apparent	---	---	---	---	---
		May	2.5	>6.0	Apparent	---	---	---	---	---
		November	2.5	>6.0	Apparent	---	---	---	---	---
		December	2.5	>6.0	Apparent	---	---	---	---	---
144C:										
Perecheney------	B									
		January	2.5	>6.0	Apparent	---	---	---	---	---
		February	2.5	>6.0	Apparent	---	---	---	---	---
		March	2.5	>6.0	Apparent	---	---	---	---	---
		April	2.5	>6.0	Apparent	---	---	---	---	---
		May	2.5	>6.0	Apparent	---	---	---	---	---
		November	2.5	>6.0	Apparent	---	---	---	---	---
		December	2.5	>6.0	Apparent	---	---	---	---	---
159A:										
Finch-----------	C									
		January	1.5	>6.0	Apparent	---	---	---	---	---
		February	1.5	>6.0	Apparent	---	---	---	---	---
		March	1.0	>6.0	Apparent	---	---	---	---	---
		April	0.5	>6.0	Apparent	---	---	---	---	---
		May	0.5	>6.0	Apparent	---	---	---	---	---
		June	1.0	>6.0	Apparent	---	---	---	---	---
		July	2.0	>6.0	Apparent	---	---	---	---	---
		August	3.0	>6.0	Apparent	---	---	---	---	---
		September	2.0	>6.0	Apparent	---	---	---	---	---
		October	1.0	>6.0	Apparent	---	---	---	---	---
		November	1.0	>6.0	Apparent	---	---	---	---	---
		December	1.5	>6.0	Apparent	---	---	---	---	---
307B:										
Klacking--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
307E:										
Klacking--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
360:										
Wakeley---------	D									
		January	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		February	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		March	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		April	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		May	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		June	0.0	2.0	Perched	---	---	---	---	---
		July	0.5	2.0	Perched	---	---	---	---	---
		August	0.5	2.0	Perched	---	---	---	---	---
		September	0.0	2.0	Perched	---	---	---	---	---
		October	0.0	2.0	Perched	---	---	---	---	---
		November	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
		December	0.0	2.0	Perched	0.0-1.0	Long	Frequent	---	---
368A:										
Au Gres---------	B									
		January	1.5	>6.0	Apparent	---	---	---	---	---
		February	1.5	>6.0	Apparent	---	---	---	---	---
		March	1.0	>6.0	Apparent	---	---	---	---	---
		April	0.5	>6.0	Apparent	---	---	---	---	---
		May	0.5	>6.0	Apparent	---	---	---	---	---
		June	1.0	>6.0	Apparent	---	---	---	---	---
		July	2.0	>6.0	Apparent	---	---	---	---	---
		August	3.0	>6.0	Apparent	---	---	---	---	---
		September	2.0	>6.0	Apparent	---	---	---	---	---
		October	1.0	>6.0	Apparent	---	---	---	---	---
		November	1.0	>6.0	Apparent	---	---	---	---	---
		December	1.5	>6.0	Apparent	---	---	---	---	---
Deford----------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		June	0.5	>6.0	Apparent	---	---	---	---	---
		July	1.5	>6.0	Apparent	---	---	---	---	---
		August	2.0	>6.0	Apparent	---	---	---	---	---
		September	1.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
369:										
Deford----------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		June	0.5	>6.0	Apparent	---	---	---	---	---
		July	1.5	>6.0	Apparent	---	---	---	---	---
		August	2.0	>6.0	Apparent	---	---	---	---	---
		September	1.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
380. Access denied										
382B:										
Proper	A									
		January	5.0	>6.0	Apparent	---	---	---	---	---
		February	5.0	>6.0	Apparent	---	---	---	---	---
		March	2.5	>6.0	Apparent	---	---	---	---	---
		April	2.0	>6.0	Apparent	---	---	---	---	---
		May	2.0	>6.0	Apparent	---	---	---	---	---
		June	3.5	>6.0	Apparent	---	---	---	---	---
		September	4.5	>6.0	Apparent	---	---	---	---	---
		October	3.0	>6.0	Apparent	---	---	---	---	---
		November	2.5	>6.0	Apparent	---	---	---	---	---
		December	2.0	>6.0	Apparent	---	---	---	---	---
408:										
Sims	D									
		January	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		February	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		March	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		April	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		May	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		June	0.0	1.0	Perched	---	---	---	---	---
		September	0.0	1.0	Perched	---	---	---	---	---
		October	0.0	1.0	Perched	---	---	---	---	---
		November	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		December	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
410B:										
Proper	A									
		January	5.0	>6.0	Apparent	---	---	---	---	---
		February	5.0	>6.0	Apparent	---	---	---	---	---
		March	2.5	>6.0	Apparent	---	---	---	---	---
		April	2.0	>6.0	Apparent	---	---	---	---	---
		May	2.0	>6.0	Apparent	---	---	---	---	---
		June	3.5	>6.0	Apparent	---	---	---	---	---
		September	4.5	>6.0	Apparent	---	---	---	---	---
		October	3.0	>6.0	Apparent	---	---	---	---	---
		November	2.5	>6.0	Apparent	---	---	---	---	---
		December	2.0	>6.0	Apparent	---	---	---	---	---
Finch	C									
		January	1.5	>6.0	Apparent	---	---	---	---	---
		February	1.5	>6.0	Apparent	---	---	---	---	---
		March	1.0	>6.0	Apparent	---	---	---	---	---
		April	0.5	>6.0	Apparent	---	---	---	---	---
		May	0.5	>6.0	Apparent	---	---	---	---	---
		June	1.0	>6.0	Apparent	---	---	---	---	---
		July	2.0	>6.0	Apparent	---	---	---	---	---
		August	3.0	>6.0	Apparent	---	---	---	---	---
		September	2.0	>6.0	Apparent	---	---	---	---	---
		October	1.0	>6.0	Apparent	---	---	---	---	---
		November	1.0	>6.0	Apparent	---	---	---	---	---
		December	1.5	>6.0	Apparent	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
410B:										
Deford----------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		June	0.5	>6.0	Apparent	---	---	---	---	---
		July	1.5	>6.0	Apparent	---	---	---	---	---
		August	2.0	>6.0	Apparent	---	---	---	---	---
		September	1.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
429D:										
Menominee-------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
441B:										
Morganlake------	B									
		March	2.0	3.5	Perched	---	---	---	---	---
		April	2.0	3.5	Perched	---	---	---	---	---
		May	2.0	3.5	Perched	---	---	---	---	---
		September	2.0	3.5	Perched	---	---	---	---	---
		October	2.0	3.5	Perched	---	---	---	---	---
		November	2.0	3.5	Perched	---	---	---	---	---
Nester----------	C									
		March	2.5	3.5	Perched	---	---	---	---	---
		April	2.5	3.5	Perched	---	---	---	---	---
		May	2.5	3.5	Perched	---	---	---	---	---
		September	2.5	3.5	Perched	---	---	---	---	---
		October	2.5	3.5	Perched	---	---	---	---	---
		November	2.5	3.5	Perched	---	---	---	---	---
441C:										
Morganlake------	B									
		March	2.0	3.5	Perched	---	---	---	---	---
		April	2.0	3.5	Perched	---	---	---	---	---
		May	2.0	3.5	Perched	---	---	---	---	---
		September	2.0	3.5	Perched	---	---	---	---	---
		October	2.0	3.5	Perched	---	---	---	---	---
		November	2.0	3.5	Perched	---	---	---	---	---
Nester----------	C									
		March	2.5	3.5	Perched	---	---	---	---	---
		April	2.5	3.5	Perched	---	---	---	---	---
		May	2.5	3.5	Perched	---	---	---	---	---
		September	2.5	3.5	Perched	---	---	---	---	---
		October	2.5	3.5	Perched	---	---	---	---	---
		November	2.5	3.5	Perched	---	---	---	---	---
442D:										
Menominee-------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Curtisville-----	D									
		All months	>6.0	>6.0	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
473:										
Deford----------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		June	0.5	>6.0	Apparent	---	---	---	---	---
		July	1.5	>6.0	Apparent	---	---	---	---	---
		August	2.0	>6.0	Apparent	---	---	---	---	---
		September	1.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
Kinross---------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
474:										
Histosols-------	---									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		June	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		July	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		August	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		September	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		October	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
Fluvaquents-----	---									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	Long	Frequent.
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	Long	Frequent.
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	Long	Frequent.
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	Long	Frequent.
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	Long	Frequent.
		June	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	Long	Frequent.
		July	0.0	>6.0	Apparent	---	---	---	Long	Frequent.
		August	0.0	>6.0	Apparent	---	---	---	Long	Frequent.
		September	0.0	>6.0	Apparent	---	---	---	Long	Frequent.
		October	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	Long	Frequent.
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	Long	Frequent.
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	Long	Frequent.

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
475B:										
Graycalm--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Klacking--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
475D:										
Graycalm--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Klacking--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
475E:										
Graycalm--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Klacking--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
476B:										
Klacking--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Perecheney------	B									
		January	2.5	>6.0	Apparent	---	---	---	---	---
		February	2.5	>6.0	Apparent	---	---	---	---	---
		March	2.5	>6.0	Apparent	---	---	---	---	---
		April	2.5	>6.0	Apparent	---	---	---	---	---
		May	2.5	>6.0	Apparent	---	---	---	---	---
		November	2.5	>6.0	Apparent	---	---	---	---	---
		December	2.5	>6.0	Apparent	---	---	---	---	---
476D:										
Klacking--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Perecheney------	B									
		January	2.5	>6.0	Apparent	---	---	---	---	---
		February	2.5	>6.0	Apparent	---	---	---	---	---
		March	2.5	>6.0	Apparent	---	---	---	---	---
		April	2.5	>6.0	Apparent	---	---	---	---	---
		May	2.5	>6.0	Apparent	---	---	---	---	---
		November	2.5	>6.0	Apparent	---	---	---	---	---
		December	2.5	>6.0	Apparent	---	---	---	---	---
490:										
Urban land.										
Aquents---------	D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		June	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		July	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		August	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		September	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		October	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
491A:										
Geels-----------	A									
		January	2.5	5.0	Perched	---	---	---	---	---
		February	2.5	5.0	Perched	---	---	---	---	---
		March	2.5	5.0	Perched	---	---	---	---	---
		April	2.5	5.0	Perched	---	---	---	---	---
		May	2.5	5.0	Perched	---	---	---	---	---
		September	2.5	5.0	Perched	---	---	---	---	---
		October	2.5	5.0	Perched	---	---	---	---	---
		November	2.5	5.0	Perched	---	---	---	---	---
		December	2.5	5.0	Perched	---	---	---	---	---
492A:										
Allendale, sandy substratum-----	C									
		January	1.0	3.0	Perched	---	---	---	---	---
		February	1.0	3.0	Perched	---	---	---	---	---
		March	1.0	3.0	Perched	---	---	---	---	---
		April	0.5	3.0	Perched	---	---	---	---	---
		May	0.5	3.0	Perched	---	---	---	---	---
		June	1.0	3.0	Perched	---	---	---	---	---
		September	1.0	3.0	Perched	---	---	---	---	---
		October	1.0	3.0	Perched	---	---	---	---	---
		November	1.0	3.0	Perched	---	---	---	---	---
		December	1.0	3.0	Perched	---	---	---	---	---
493A:										
Otisco----------	A									
		January	1.0	>6.0	Apparent	---	---	---	---	---
		February	1.0	>6.0	Apparent	---	---	---	---	---
		March	1.0	>6.0	Apparent	---	---	---	---	---
		April	0.5	>6.0	Apparent	---	---	---	---	---
		May	0.5	>6.0	Apparent	---	---	---	---	---
		June	1.0	>6.0	Apparent	---	---	---	---	---
		September	1.0	>6.0	Apparent	---	---	---	---	---
		October	1.0	>6.0	Apparent	---	---	---	---	---
		November	1.0	>6.0	Apparent	---	---	---	---	---
		December	1.0	>6.0	Apparent	---	---	---	---	---
495B:										
Gerrish---------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
495D:										
Gerrish---------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
495F:										
Gerrish---------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
496B:										
Gerrish---------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Grayling--------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
496D:										
Gerrish----------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Grayling---------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
496F:										
Gerrish----------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
Grayling---------	A									
		All months	>6.0	>6.0	---	---	---	---	---	---
497A:										
Debolt-----------	B									
		January	2.5	3.5	Perched	---	---	---	---	---
		February	2.5	3.5	Perched	---	---	---	---	---
		March	1.5	3.0	Perched	---	---	---	---	---
			3.5	>6.0	Apparent					
		April	3.5	>6.0	Apparent	---	---	---	---	---
			1.5	3.0	Perched					
		May	3.5	>6.0	Apparent	---	---	---	---	---
			1.5	3.0	Perched					
		June	3.5	>6.0	Apparent	---	---	---	---	---
		October	1.5	3.0	Perched	---	---	---	---	---
			3.5	>6.0	Apparent					
		November	1.5	3.0	Perched	---	---	---	---	---
			3.5	>6.0	Apparent					
		December	2.5	3.5	Perched	---	---	---	---	---
498A:										
Pinewood---------	C									
		January	1.0	2.0	Perched	---	---	---	---	---
		February	1.0	2.0	Perched	---	---	---	---	---
		March	1.0	2.0	Perched	---	---	---	---	---
		April	1.0	2.0	Perched	---	---	---	---	---
		November	1.0	2.0	Perched	---	---	---	---	---
		December	1.0	2.0	Perched	---	---	---	---	---
499:										
Dawson-----------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Very long	Frequent	---	---

Table 22.--Water Features--Continued

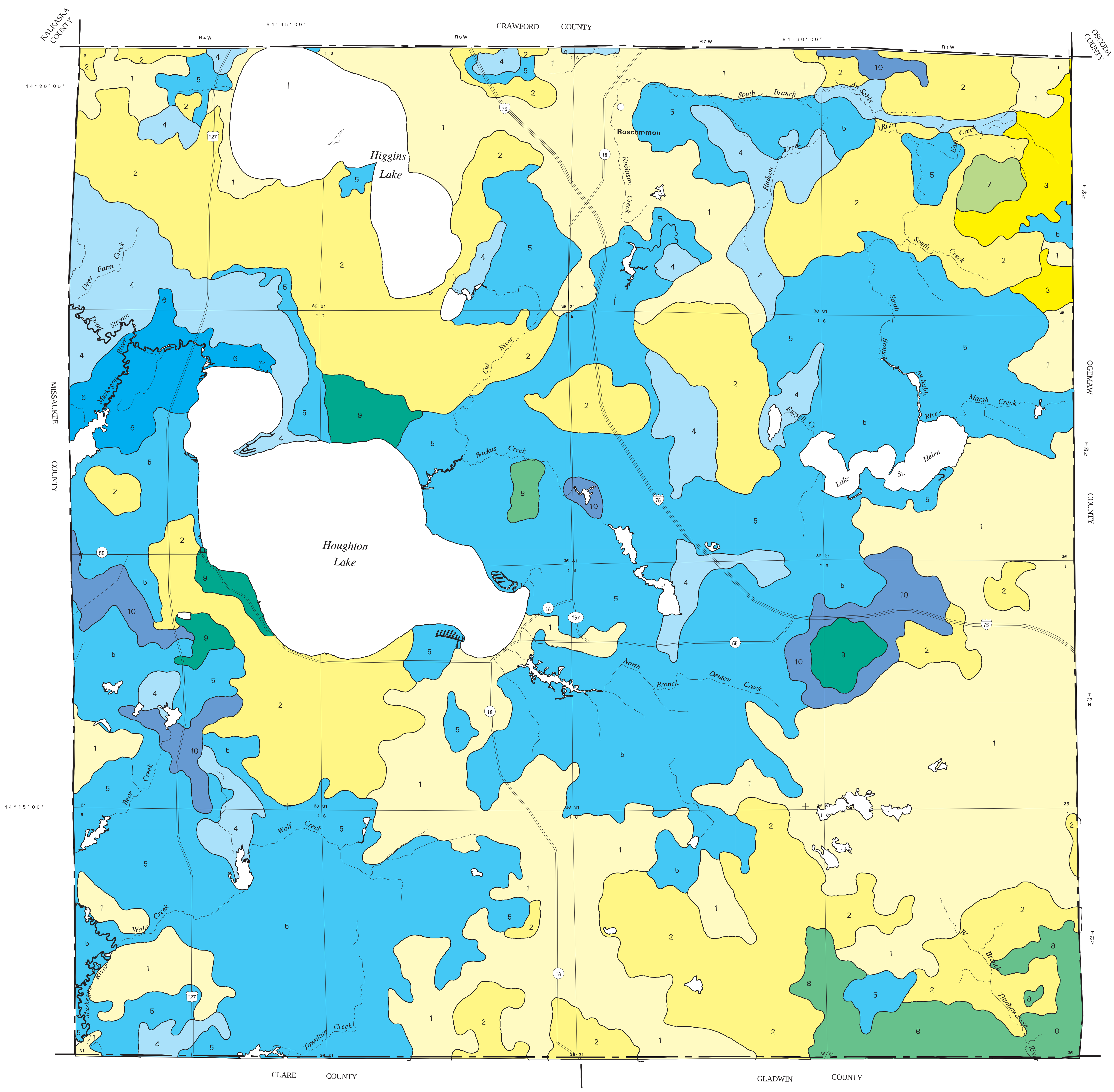
Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
499:										
Kinross----------	A/D									
		January	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		February	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		March	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		April	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		May	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		June	0.0	>6.0	Apparent	---	---	---	---	---
		July	0.5	>6.0	Apparent	---	---	---	---	---
		August	0.5	>6.0	Apparent	---	---	---	---	---
		September	0.0	>6.0	Apparent	---	---	---	---	---
		October	0.0	>6.0	Apparent	---	---	---	---	---
		November	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
		December	0.0	>6.0	Apparent	0.0-1.0	Long	Frequent	---	---
500A:										
Flink------------	B									
		January	1.0	4.0	Perched	---	---	---	---	---
		February	1.0	4.0	Perched	---	---	---	---	---
		March	0.5	4.0	Perched	---	---	---	---	---
		April	0.5	4.0	Perched	---	---	---	---	---
		May	0.5	4.0	Perched	---	---	---	---	---
		June	1.0	4.0	Perched	---	---	---	---	---
		September	1.0	4.0	Perched	---	---	---	---	---
		October	1.0	4.0	Perched	---	---	---	---	---
		November	1.0	4.0	Perched	---	---	---	---	---
		December	1.0	4.0	Perched	---	---	---	---	---
501B:										
Kellogg, sandy substratum-----	B									
		January	2.0	5.0	Perched	---	---	---	---	---
		February	2.0	5.0	Perched	---	---	---	---	---
		March	2.0	5.0	Perched	---	---	---	---	---
		April	2.0	5.0	Perched	---	---	---	---	---
		May	2.0	5.0	Perched	---	---	---	---	---
		October	2.0	5.0	Perched	---	---	---	---	---
		November	2.0	5.0	Perched	---	---	---	---	---
		December	2.0	5.0	Perched	---	---	---	---	---
502B:										
Kawkawlin--------	C									
		January	1.0	2.0	Perched	---	---	---	---	---
		February	1.0	2.0	Perched	---	---	---	---	---
		March	1.0	2.0	Perched	---	---	---	---	---
		April	0.5	2.0	Perched	---	---	---	---	---
		May	0.5	2.0	Perched	---	---	---	---	---
		October	1.0	2.0	Perched	---	---	---	---	---
		November	1.0	2.0	Perched	---	---	---	---	---
		December	1.0	2.0	Perched	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
502B:										
Sims------------	D									
		January	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		February	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		March	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		April	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		May	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		June	0.0	1.5	Perched	---	---	---	---	---
		September	0.0	1.5	Perched	---	---	---	---	---
		October	0.0	1.5	Perched	---	---	---	---	---
		November	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---
		December	0.0	1.5	Perched	0.0-1.0	Long	Frequent	---	---

Table 23.--Classification of the Soils

Soil name	Family or higher taxonomic class
Allendale	Sandy over clayey, mixed, semiactive, frigid Alfic Epiaquods
Aquents	Aquents
Au Gres	Sandy, mixed, frigid Typic Endoaquods
Ausable	Sandy, mixed, frigid Histic Humaquepts
Bowers	Fine, mixed, semiactive, frigid Aquic Glossudalfs
Bowstring	Euic, frigid Fluvaquentic Haplosaprists
Chinwhisker	Sandy, mixed, frigid Lamellic Haplorthods
Croswell	Sandy, mixed, frigid Oxyaquic Haplorthods
Cublake	Sandy, mixed, frigid Oxyaquic Haplorthods
Curtisville	Fine, mixed, semiactive, frigid Haplic Glossudalfs
Dawson	Sandy or sandy-skeletal, mixed, dysic, frigid Terric Haplosaprists
Debolt	Clayey over sandy or sandy-skeletal, mixed, semiactive, frigid Oxyaquic Glossudalfs
Deerheart	Fine-loamy, mixed, semiactive, nonacid, frigid Aeric Endoaquepts
Deford	Mixed, frigid Typic Psammaquents
Finch	Sandy, mixed, frigid, shallow, ortstein Typic Duraquods
Flink	Sandy, mixed, frigid Typic Epiaquods
Fluvaquents	Fluvaquents
Geels	Sandy, mixed, frigid Oxyaquic Hapludalfs
Gerrish	Mixed, frigid Lamellic Udipsamments
Graycalm	Mixed, frigid Lamellic Udipsamments
Grayling	Mixed, frigid Typic Udipsamments
Histosols	Histosols
Ingalls	Sandy over loamy, mixed, active, frigid Typic Endoaquods
Kawkawlin	Fine, mixed, semiactive, frigid Aquic Glossudalfs
Kellogg	Sandy over clayey, mixed, active, frigid Alfic Oxyaquic Haplorthods
Kinross	Sandy, mixed, frigid Typic Endoaquods
Klacking	Loamy, mixed, semiactive, frigid Arenic Glossudalfs
Kneff	Fine-silty, mixed, semiactive, frigid Oxyaquic Glossudalfs
Leafriver	Sandy, mixed, frigid Histic Humaquepts
Loxley	Dysic, frigid Typic Haplosaprists
Lupton	Euic, frigid Typic Haplosaprists
Menominee	Sandy over loamy, mixed, active, frigid Alfic Haplorthods
Morganlake	Sandy over loamy, mixed, active, frigid Alfic Oxyaquic Haplorthods
Nester	Fine, mixed, semiactive, frigid Oxyaquic Glossudalfs
Otisco	Sandy, mixed, frigid Argic Endoaquods
Perecheney	Fine-loamy, mixed, active, frigid Oxyaquic Glossudalfs
Pinewood	Fine, mixed, semiactive, frigid Aquic Glossudalfs
Proper	Sandy, mixed, frigid, ortstein Oxyaquic Haplorthods
Rubicon	Sandy, mixed, frigid Entic Haplorthods
Sims	Fine, mixed, semiactive, nonacid, frigid Mollic Epiaquepts
Tawas	Sandy or sandy-skeletal, mixed, euic, frigid Terric Haplosaprists
Udipsamments	Udipsamments
Udorthents	Udorthents
Wakeley	Sandy over clayey, mixed, semiactive, nonacid, frigid Aeric Epiaquents



N

SOIL LEGEND

1	Graycalm-Grayling association
2	Graycalm-Klacking-Perecheney association
3	Kellogg-Allendale association
4	Tawas-Lupton-Leafriver association
5	Croswell-Au Gres-Tawas association
6	Wakeley-Au Gres-Deford association
7	Debolt-Pinewood association
8	Nester-Morganlake-Rubicon association
9	Kawkawlin-Sims-Nester association
10	Wakeley-Allendale association

Compiled 2002

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

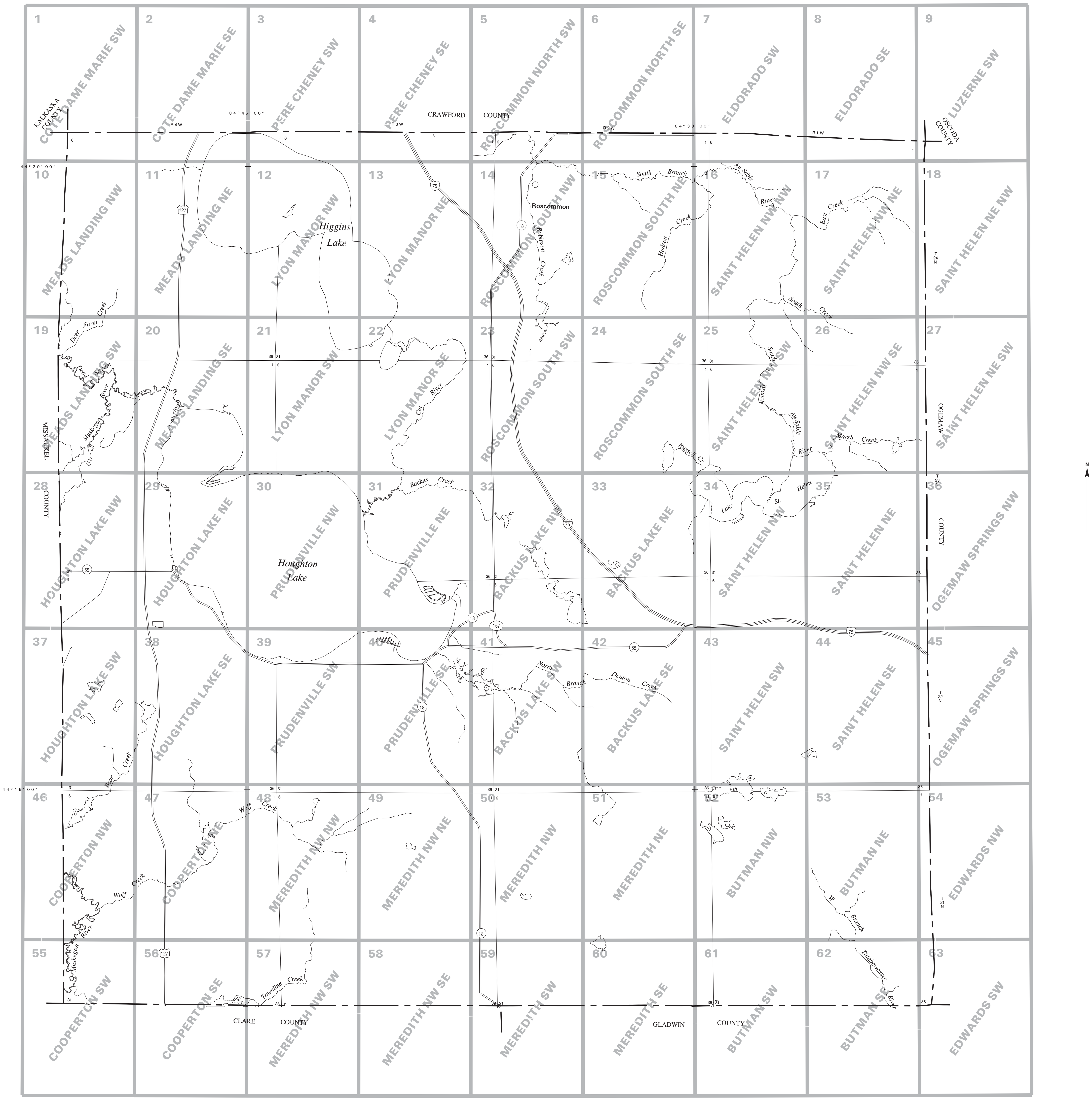
UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
MICHIGAN DEPARTMENT OF AGRICULTURE
MICHIGAN AGRICULTURAL EXPERIMENT STATION
MICHIGAN STATE UNIVERSITY EXTENSION
MICHIGAN TECHNOLOGICAL UNIVERSITY
ROSCOMMON COUNTY BOARD OF COMMISSIONERS

GENERAL SOIL MAP
ROSCOMMON COUNTY, MICHIGAN

1 0 1 2 3
MILES

1 0 1 2 3 4 5 6
KILOMETERS

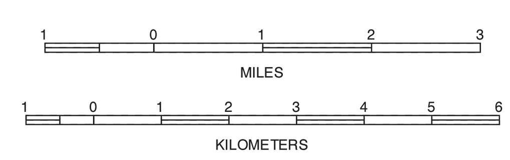
SCALE = 1:105000



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS
ROSCOMMON COUNTY, MICHIGAN



SOIL LEGEND

Most map symbols consist of numbers or a combination of numbers and letters. The initial numbers represent the kind of soil. An uppercase letter following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils or for miscellaneous areas.

SYMBOL	NAME
13	Tawas-Lupton mucks
14	Dawson-Loxley peats
15A	Croswell-Au Gres sands, 0 to 3 percent slopes
16B	Graycalm sand, 0 to 6 percent slopes
17A	Croswell sand, 0 to 3 percent slopes
18A	Au Gres sand, 0 to 3 percent slopes
20B	Graycalm-Grayling sands, 0 to 6 percent slopes
20D	Graycalm-Grayling sands, 6 to 18 percent slopes
20F	Graycalm-Grayling sands, 18 to 45 percent slopes
23	Ausable-Bowstring mucks, frequently flooded
24A	Kinross-Au Gres complex, 0 to 3 percent slopes
26B	Cublake sand, 0 to 6 percent slopes
34B	Kneff very fine sandy loam, 0 to 6 percent slopes
35	Kinross muck
47D	Graycalm sand, 6 to 18 percent slopes
47F	Graycalm sand, 18 to 45 percent slopes
50B	Au Gres-Kinross-Croswell complex, 0 to 6 percent slopes
51	Tawas-Leafriver mucks
57B	Kawkawlin loam, 1 to 4 percent slopes
58A	Wakeley-Allendale complex, 0 to 3 percent slopes
67A	Bowers-Deerheart complex, 0 to 3 percent slopes
75B	Rubicon sand, 0 to 6 percent slopes
75D	Rubicon sand, 6 to 18 percent slopes
78	Pits, borrow
81B	Grayling sand, 0 to 6 percent slopes
81D	Grayling sand, 6 to 18 percent slopes
81F	Grayling sand, 18 to 45 percent slopes
82B	Udorthents, loamy, nearly level and undulating
83B	Udipsamments, nearly level and undulating
83F	Udipsamments, nearly level to very steep
86	Histosols and Aquents, ponded
87	Ausable muck, frequently flooded
90B	Chinwhisker sand, 0 to 4 percent slopes
102D	Curtisville loam, 12 to 18 percent slopes
103B	Nester sandy loam, 1 to 6 percent slopes
103C	Nester sandy loam, 6 to 12 percent slopes
114A	Ingalls sand, 0 to 3 percent slopes
120B	Morganlake sand, 0 to 6 percent slopes
120C	Morganlake sand, 6 to 12 percent slopes
123D	Klacking sand, 6 to 18 percent slopes
144B	Perecheney sand, 0 to 6 percent slopes
144C	Perecheney sand, 6 to 12 percent slopes
159A	Finch sand, 0 to 3 percent slopes
307B	Klacking sand, 0 to 6 percent slopes
307E	Klacking sand, 18 to 35 percent slopes
360	Wakeley muck
368A	Au Gres-Deford complex, 0 to 3 percent slopes
369	Deford muck
380	Access denied
382B	Proper sand, 0 to 6 percent slopes
408	Sims loam
410B	Proper-Finch-Deford complex, 0 to 6 percent slopes
429D	Menominee sand, 12 to 18 percent slopes
441B	Morganlake-Nester complex, 0 to 6 percent slopes
441C	Morganlake-Nester complex, 6 to 12 percent slopes
442D	Menominee-Curtisville complex, 12 to 18 percent slopes
473	Deford-Kinross mucks
474	Histosols-Fluvaquents complex, frequently flooded
475B	Graycalm-Klacking sands, 0 to 6 percent slopes
475D	Graycalm-Klacking sands, 6 to 18 percent slopes
475E	Graycalm-Klacking sands, 18 to 35 percent slopes
476B	Klacking-Perecheney sands, 0 to 6 percent slopes
476D	Klacking-Perecheney sands, 6 to 18 percent slopes
490	Urban land-Aquents, nearly level
491A	Geels sand, 0 to 3 percent slopes
492A	Allendale sand, 0 to 3 percent slopes, sandy substratum
493A	Otisco sand, 0 to 3 percent slopes
495B	Gerrish sand, 0 to 6 percent slopes
495D	Gerrish sand, 6 to 18 percent slopes
495F	Gerrish sand, 18 to 45 percent slopes
496B	Gerrish-Grayling sands, 0 to 6 percent slopes
496D	Gerrish-Grayling sands, 6 to 18 percent slopes
496F	Gerrish-Grayling sands, 18 to 45 percent slopes
497A	Debolt sandy loam, 0 to 3 percent slopes
498A	Pinewood sandy loam, 0 to 2 percent slopes
499	Dawson-Kinross complex
500A	Flink sand, 0 to 3 percent slopes
501B	Kellogg sand, 0 to 6 percent slopes, sandy substratum
502B	Kawkawlin-Sims loams, 0 to 4 percent slopes
W	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Limit of soil survey (label) and/or denied access area
- Field sheet matchline & neatline

OTHER BOUNDARY (label)

- Airport, airfield
- Cemetery

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION

- Divided roads
- Other roads

ROAD EMBLEM & DESIGNATIONS

- Interstate — 173, 79/340
- Federal — 287, 410/224
- State — 52, 52/347
- County, farm or ranch — 1283

RAILROAD

LEVEES

Single side slope
(showing actual feature location)

DAMS

Medium or Small

HYDROGRAPHIC FEATURES

STREAMS

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

DRAINAGE AND IRRIGATION

- Perennial drainage and/or irrigation ditch
- Intermittent drainage and/ or irrigation ditch

SMALL LAKES, PONDS AND RESERVOIRS

- Perennial water
- Miscellaneous water

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS — 81B 81D

LANDFORM FEATURES

ESCARPMENTS

- Other than bedrock
- SHORT STEEP SLOPE
- DEPRESSION, closed

EXCAVATIONS

PITS

- Borrow pits
- Gravel pit
- LANDFILL

MISCELLANEOUS SURFACE FEATURES

- Blowout
- Gravelly spot
- Marsh or swamp
- Sandy spot
- Severely eroded spot
- Spoil area
- Stony spot
- Wet spot

AD HOC FEATURES

- Bog
- Cut and fill spot
- Gravel strata
- Loam at depth
- Loamy spot
- Mineral spot
- Organic spot

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
COTE DAME MARIE SW QUADRANGLE
SHEET NUMBER 1 OF 63

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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

A	B	C
D		2
E	10	11

A FLETCHER NE (KALKASKA COUNTY)
B COTE DAME MARIE NW (CRAWFORD COUNTY)
C COTE DAME MARIE NE (CRAWFORD COUNTY)
D FLETCHER SE (KALKASKA COUNTY)
2 COTE DAME MARIE SE
E ADDIS CREEK NE (MISSAUKEE COUNTY)
10 MEADS LANDING NW
11 MEADS LANDING NE

INDEX TO ADJOINING 3.75 MAPS

COTE DAME MARIE SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 1 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
COTE DAME MARIE SE QUADRANGLE
SHEET NUMBER 2 OF 63

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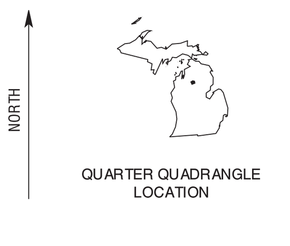

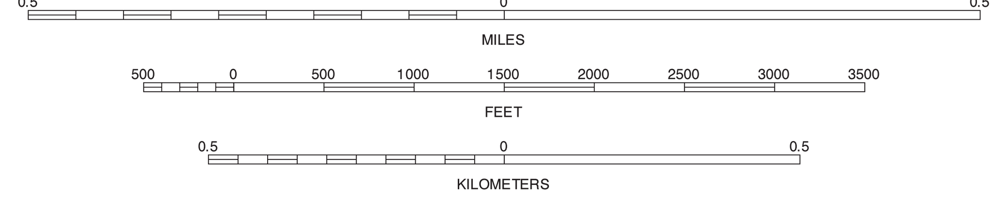

A	B	C
1		3
10	11	12

A COTE DAME MARIE NW (CRAWFORD COUNTY)
B COTE DAME MARIE NE (CRAWFORD COUNTY)
C PERE CHENEY NW (CRAWFORD COUNTY)
1 COTE DAME MARIE SW
3 PERE CHENEY SW
10 MEADS LANDING NW
11 MEADS LANDING NE
12 LYON MANOR NW

INDEX TO ADJOINING 3.75 MAPS

COTE DAME MARIE SE, MICHIGAN

3.75 MINUTE SERIES
SHEET NUMBER 2 OF 63

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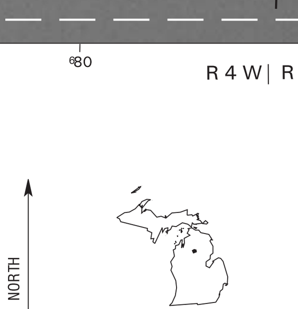

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS: 0.5 0 0.5

A	B	C
2		4
11	12	13

A COTE DAME MARIE NE (CRAWFORD COUNTY)
B PERE CHENEY NW (CRAWFORD COUNTY)
C PERE CHENEY NE (CRAWFORD COUNTY)
2 COTE DAME MARIE SE
4 PERE CHENEY SE
11 MEADS LANDING NE
12 LYON MANOR NW
13 LYON MANOR NE

INDEX TO ADJOINING 3.75 MAPS

PERE CHENEY SW, MICHIGAN

3.75 MINUTE SERIES
SHEET NUMBER 3 OF 63

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UNITED STATES
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NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
PERE CHENEY SE QUADRANGLE
SHEET NUMBER 4 OF 63

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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

A	B	C
3		5
12	13	14

A PERE CHENEY NW (CRAWFORD)
B PERE CHENEY NE (CRAWFORD)
C ROSCOMMON NORTH NW (CRAWFORD)
3 PERE CHENEY SW
5 ROSCOMMON NORTH SW
12 LYON MANOR NW
13 LYON MANOR NE
14 ROSCOMMON SOUTH NW

INDEX TO ADJOINING 3.75 MAPS

PERE CHENEY SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 4 OF 63

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
ROSCOMMON NORTH SW QUADRANGLE
SHEET NUMBER 5 OF 63

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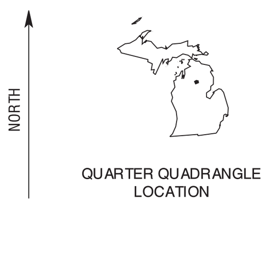
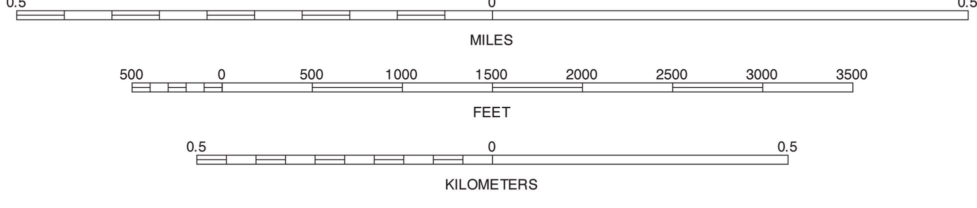


QUARTER QUADRANGLE LOCATION

SCALE 1:12000



A	B	C
4		6
13	14	15

A PERE CHENEY NE (CRAWFORD)
B ROSCOMMON NORTH NW (CRAWFORD)
C ROSCOMMON NORTH NE (CRAWFORD)
4 PERE CHENEY SE
6 ROSCOMMON NORTH SE
13 LYON MANOR NE
14 ROSCOMMON SOUTH NW
15 ROSCOMMON SOUTH NE

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ROSCOMMON NORTH SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 5 OF 63

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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

A	B	C
5		7
14	15	16

A ROSCOMMON NORTH NW (CRAWFORD COUNTY)
B ROSCOMMON NORTH NE (CRAWFORD COUNTY)
C ELDORADO NW (CRAWFORD COUNTY)
5 ROSCOMMON NORTH SW
7 ELDORADO SW
14 ROSCOMMON SOUTH NW
15 ROSCOMMON SOUTH NE
16 SAINT HELEN NW NW

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ROSCOMMON NORTH SE, MICHIGAN

3.75 MINUTE SERIES
SHEET NUMBER 6 OF 63

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
ELDORADO SW QUADRANGLE
SHEET NUMBER 7 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

A	B	C
6		8
15	16	17

A ROSCOMMON NORTH NE (CRAWFORD COUNTY)
B ELDORADO NW (CRAWFORD COUNTY)
C ELDORADO NE (CRAWFORD COUNTY)
6 ROSCOMMON NORTH SE
8 ELDORADO SE
15 ROSCOMMON SOUTH NE
16 SAINT HELEN NW NW
17 SAINT HELEN NW NE

INDEX TO ADJOINING 3.75 MAPS

ELDORADO SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 7 OF 63

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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 — 0 — 0.5 MILES

500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500 FEET

0.5 — 0 — 0.5 KILOMETERS

A	B	C
7		9
16	17	18

A ELDORADO NW (CRAWFORD COUNTY)
B ELDORADO NE (CRAWFORD COUNTY)
C LUZERNE NW (OSCODA COUNTY)
7 ELDORADO SW
9 LUZERNE SW
16 SAINT HELEN NW NW
17 SAINT HELEN NW NE
18 SAINT HELEN NE NW

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ELDORADO SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 8 OF 63

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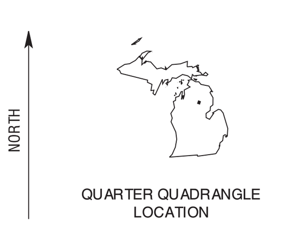
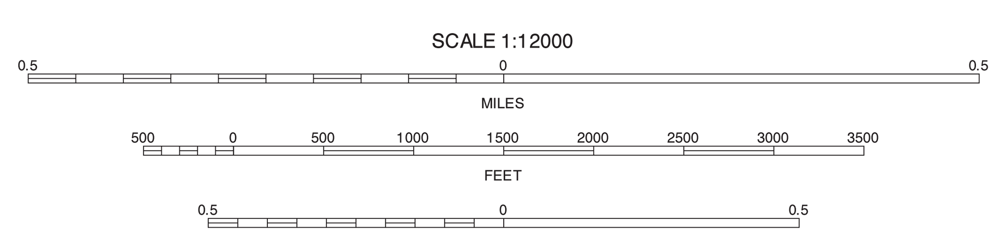


QUARTER QUADRANGLE LOCATION

SCALE 1:12000



A	B	C
8		D
17	18	E

A ELDORADO NE (CRAWFORD COUNTY)
B LUZERNE NW (OSCODA COUNTY)
C LUZERNE NE (OSCODA COUNTY)
8 ELDORADO SE
D LUZERNE SE (OSCODA COUNTY)
17 SAINT HELEN NW NE
18 SAINT HELEN NE NW
E SAINT HELEN NE NE (OGEMAW)

INDEX TO ADJOINING 3.75 MAPS

LUZERNE SW, MICHIGAN

3.75 MINUTE SERIES
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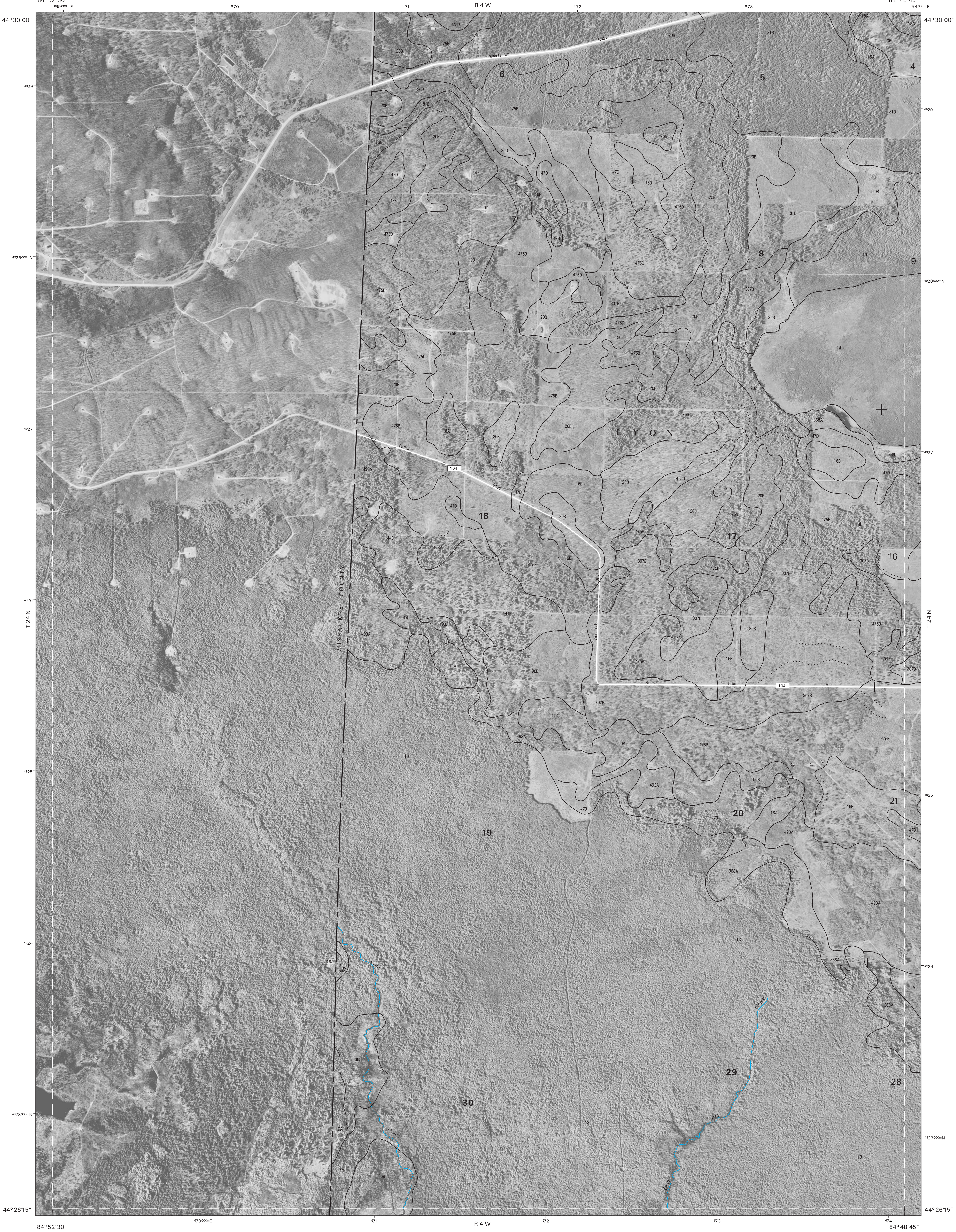
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
MEADS LANDING NW QUADRANGLE
SHEET NUMBER 10 OF 63



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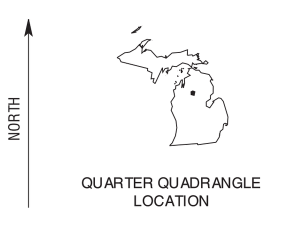
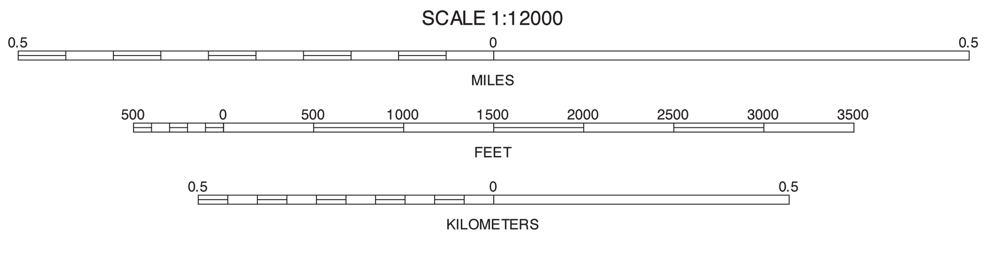


QUARTER QUADRANGLE LOCATION

SCALE 1:12000



A	1	2
B		11
C	19	20

A FLETCHER SE (KALKASKA COUNTY)
1 COTE DAME MARIE SW
2 COTE DAME MARIE SE
B ADDIS CREEK NE (MISSAUKEE COUNTY)
11 MEADS LANDING NE
C ADDIS CREEK SE (MISSAUKEE COUNTY)
19 MEADS LANDING SW
20 MEADS LANDING SE

INDEX TO ADJOINING 3.75 MAPS

MEADS LANDING NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 10 OF 63

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UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
MEADS LANDING NE QUADRANGLE
SHEET NUMBER 11 OF 63

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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

1	2	3
10		12
19	20	21

1 COTE DAME MARIE SW
2 COTE DAME MARIE SE
3 PERE CHENEY SW
10 MEADS LANDING NW
12 LYON MANOR NW
19 MEADS LANDING SW
20 MEADS LANDING SE
21 LYON MANOR SW

INDEX TO ADJOINING 3.75 MAPS

MEADS LANDING NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 11 OF 63

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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS 0.5 0 0.5

2	3	4
11		13
20	21	22

2 COTE DAME MARIE SE
3 PERE CHENEY SW
4 PERE CHENEY SE
11 MEADS LANDING NE
13 LYON MANOR NE
20 MEADS LANDING SE
21 LYON MANOR SW
22 LYON MANOR SE

INDEX TO ADJOINING 3.75 MAPS

LYON MANOR NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 12 OF 63

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UNITED STATES
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NATURAL RESOURCES CONSERVATION SERVICE

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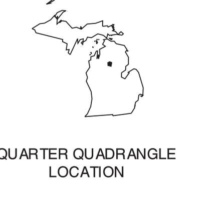
North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

3	4	5
12		14
21	22	23

3 PERE CHENEY SW
4 PERE CHENEY SE
5 ROSCOMMON NORTH SW
12 LYON MANOR NW
14 ROSCOMMON SOUTH NW
21 LYON MANOR SW
22 LYON MANOR SE
23 ROSCOMMON SOUTH SW

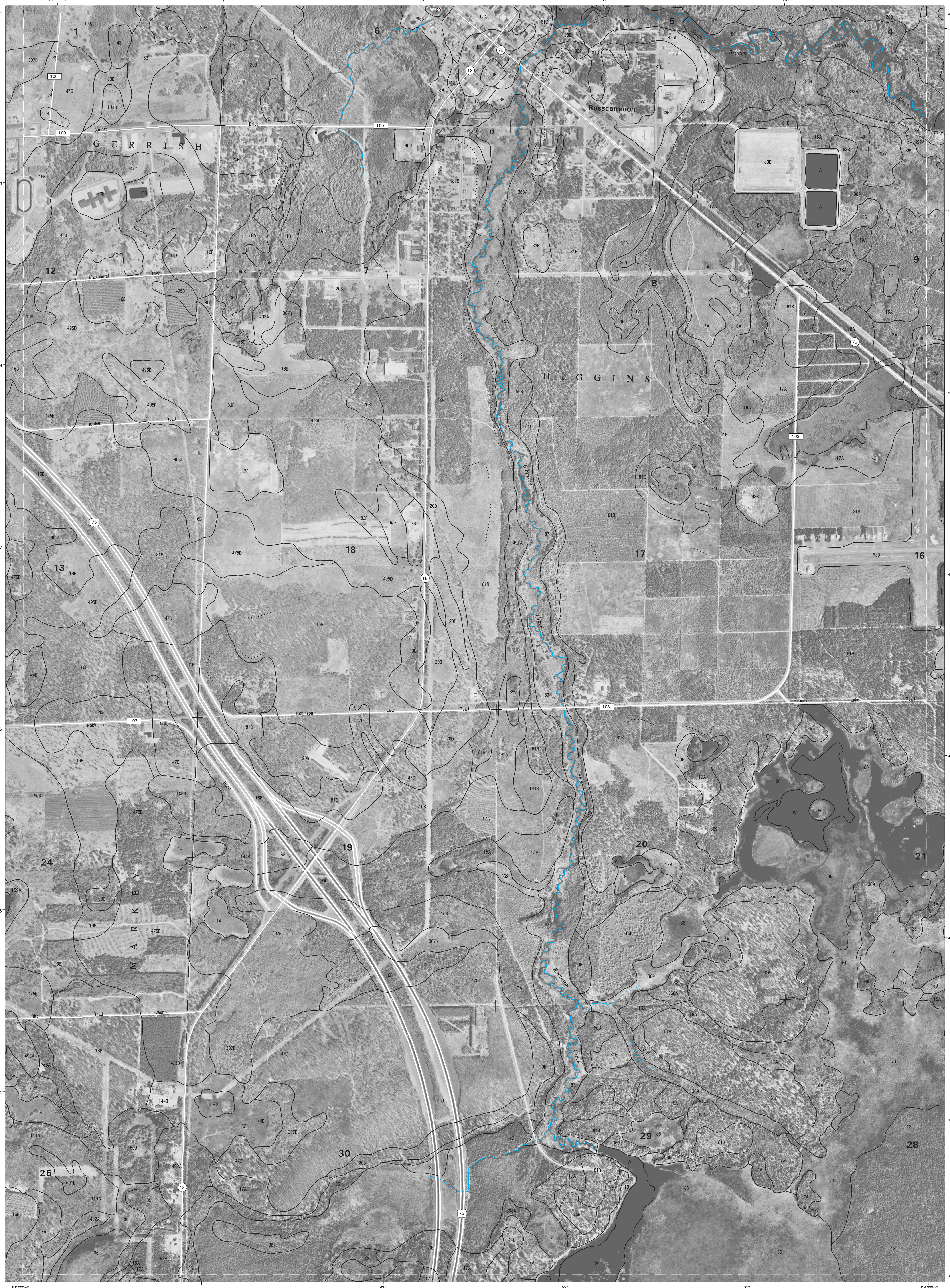
INDEX TO ADJOINING 3.75 MAPS

LYON MANOR NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 13 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
ROSCOMMON SOUTH NW QUADRANGLE
SHEET NUMBER 14 OF 63



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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

4	5	6
13		15
22	23	24

4 PERE CHENEY SE
5 ROSCOMMON NORTH SW
6 ROSCOMMON NORTH SE
13 LYON MANOR NE
15 ROSCOMMON SOUTH NE
22 LYON MANOR SE
23 ROSCOMMON SOUTH SW
24 ROSCOMMON SOUTH SE

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ROSCOMMON SOUTH NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 14 OF 63

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DEPARTMENT OF AGRICULTURE
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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

5	6	7
14		16
23	24	25

5 ROSCOMMON NORTH SW
6 ROSCOMMON NORTH SE
7 ELDORADO SW
14 ROSCOMMON SOUTH NW
16 SAINT HELEN NW NW
23 ROSCOMMON SOUTH SW
24 ROSCOMMON SOUTH SE
25 SAINT HELEN NW SW

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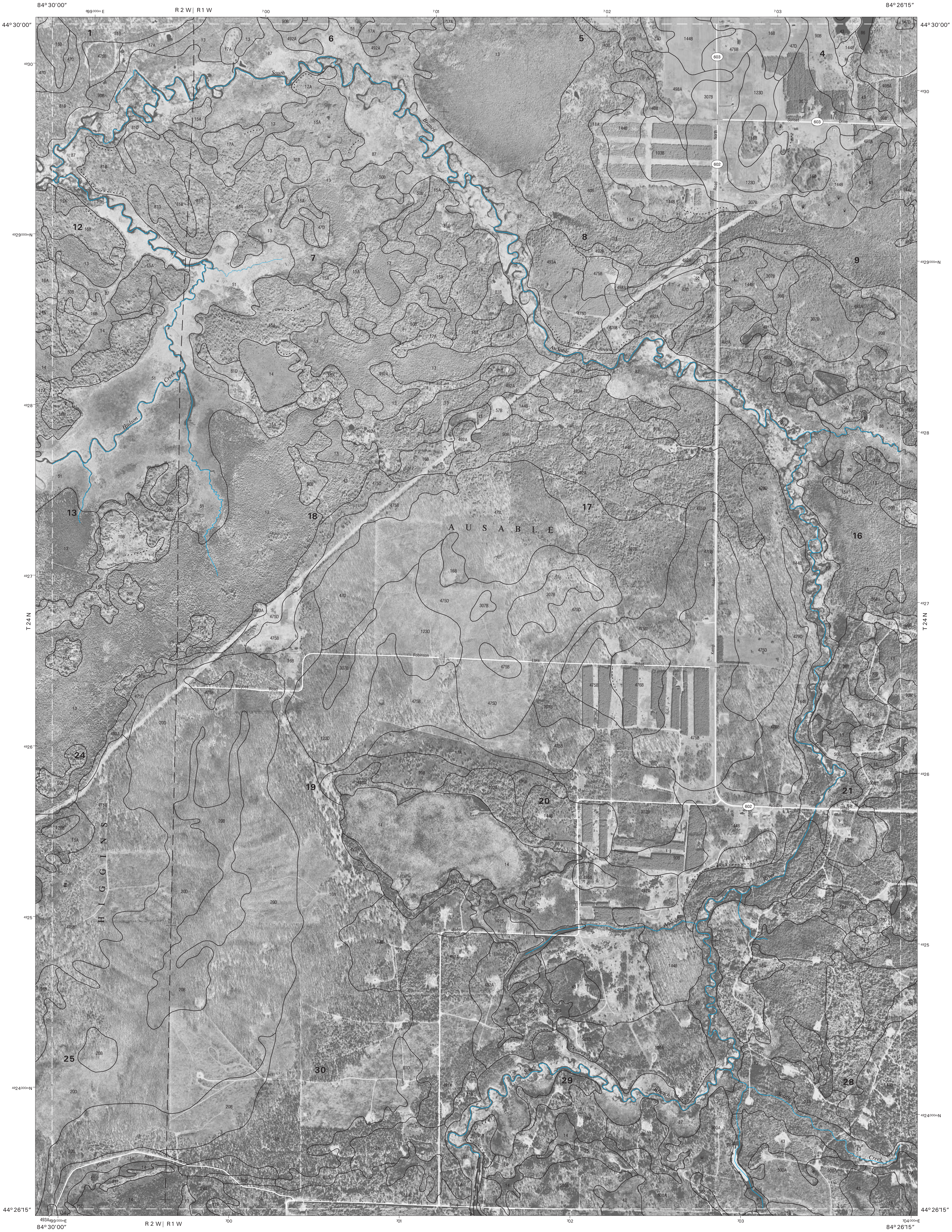
ROSCOMMON SOUTH NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 15 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
SAINT HELEN NW NW QUADRANGLE
SHEET NUMBER 16 OF 63



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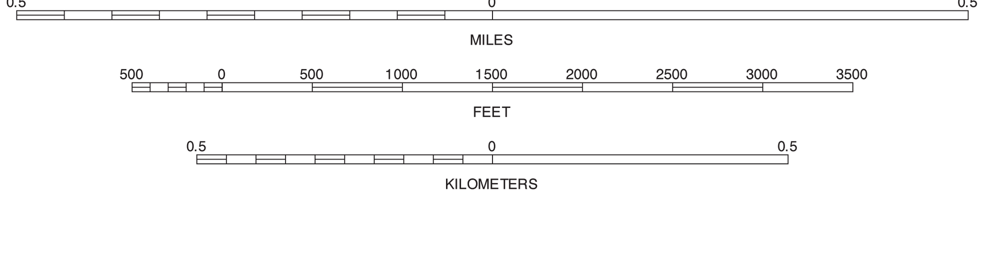
QUARTER QUADRANGLE LOCATION

SCALE 1:12000



6	7	8
15		17
24	25	26

6 ROSCOMMON NORTH SE (CRAWFORD COUNTY)
7 ELDORADO SW (CRAWFORD COUNTY)
8 ELDORADO SE (CRAWFORD COUNTY)
15 ROSCOMMON SOUTH NE
17 SAINT HELEN NW NE
24 ROSCOMMON SOUTH SE
25 SAINT HELEN NW SW
26 SAINT HELEN NW SE

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SAINT HELEN NW NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 16 OF 63

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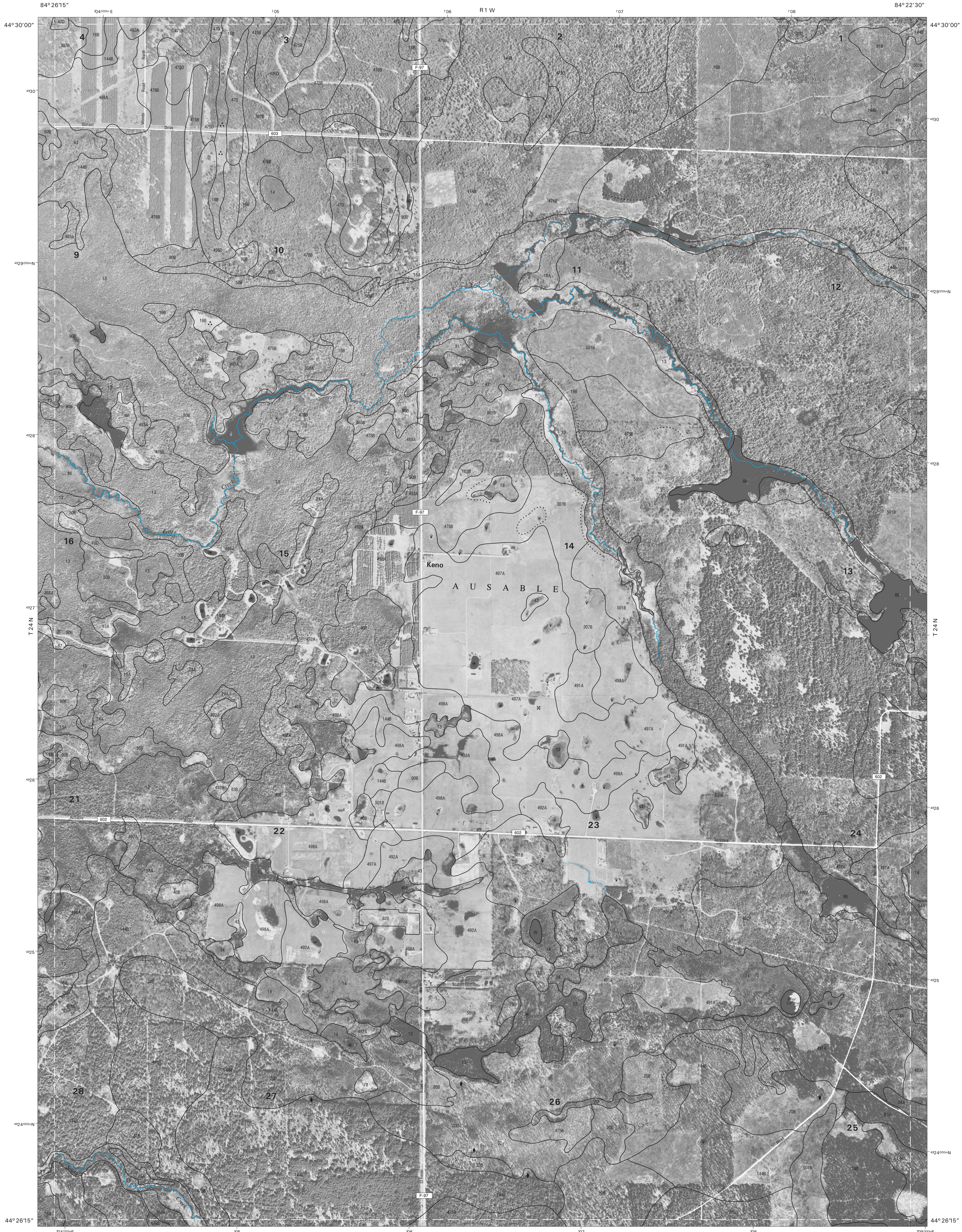

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

7	8	9
16		18
25	26	27

7 ELDORADO SW
8 ELDORADO SE
9 LUZERNE SW
16 SAINT HELEN NW NW
18 SAINT HELEN NE NW
25 SAINT HELEN NW SW
26 SAINT HELEN NW SE
27 SAIEN HELEN NE SW

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SAINT HELEN NW NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 17 OF 63

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UNITED STATES
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ROSCOMMON COUNTY, MICHIGAN
SAINT HELEN NE NW QUADRANGLE
SHEET NUMBER 18 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES 0.5 — 0 — 0.5

FEET 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS 0.5 — 0 — 0.5

8	9	A
17		B
26	27	C

8 ELDORADO SE
9 LUZERNE SW
A LUZERNE SE (OSCODA COUNTY)
17 SAINT HELEN NW NE
B SAINT HELEN NE NE (OGEMAW COUNTY)
26 SAINT HELEN NW SE
27 SAINT HELEN NE SW (OGEMAW COUNTY)
C SAINT HELEN NE SE (OGEMAW COUNTY)

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SAINT HELEN NE NW, MICHIGAN

3.75 MINUTE SERIES
SHEET NUMBER 18 OF 63

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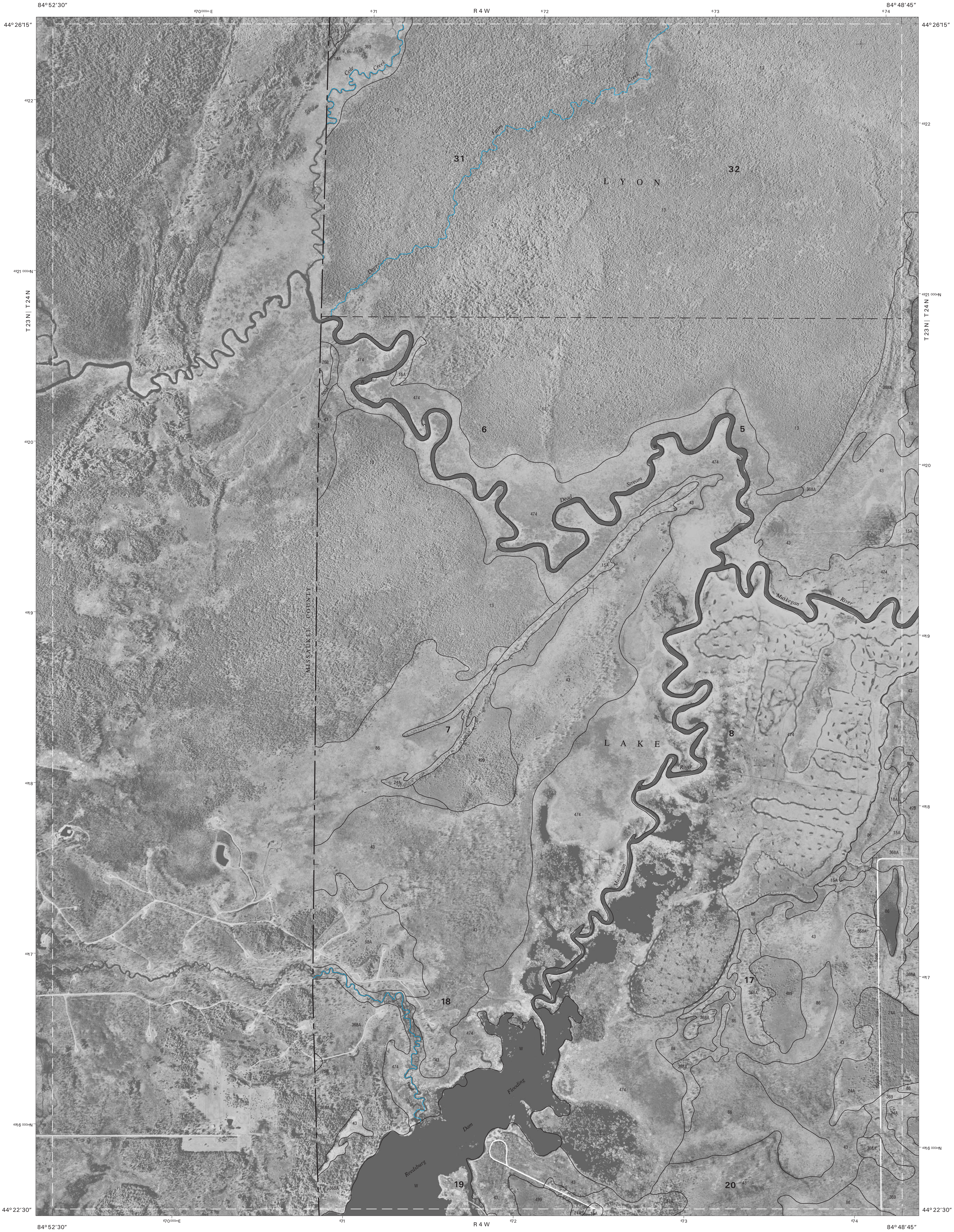
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
MEADS LANDING SW QUADRANGLE
SHEET NUMBER 19 OF 63



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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

A	10	11
B		20
C	28	29

A ADDIS CREEK NE (MISSAUKEE COUNTY)
10 MEADS LANDING NW
11 MEADS LANDING NE
B ADDIS CREEK SE (MISSAUKEE COUNTY)
20 MEADS LANDING SE
C MERRITT NE (MISSAUKEE COUNTY)
28 HOUGHTON LAKE NW
29 HOUGHTON LAKE NE

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MEADS LANDING SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 19 OF 63

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DEPARTMENT OF AGRICULTURE
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ROSCOMMON COUNTY, MICHIGAN
MEADS LANDING SE QUADRANGLE
SHEET NUMBER 20 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

10	11	12
19		21
28	29	30

10 MEADS LANDING NW
11 MEADS LANDING NE
12 LYON MANOR NW
19 MEADS LANDING SW
21 LYON MANOR SW
28 HOUGHTON LAKE NW
29 HOUGHTON LAKE NE
30 PRUDENVILLE NW

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MEADS LANDING SE, MICHIGAN

3.75 MINUTE SERIES
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ROSCOMMON COUNTY, MICHIGAN
LYON MANOR SW QUADRANGLE
SHEET NUMBER 21 OF 63

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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS: 0.5 — 0 — 0.5

11	12	13	11 MEADS LANDING NE 12 LYON MANOR NW 13 LYON MANOR NE
20		22	20 MEADS LANDING SE 22 LYON MANOR SE
29	30	31	29 HOUGHTON LAKE NE 30 PRUDENVILLE NW 31 PRUDENVILLE NE

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LYON MANOR SW, MICHIGAN
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ROSCOMMON COUNTY, MICHIGAN
LYON MANOR SE QUADRANGLE
SHEET NUMBER 22 OF 63

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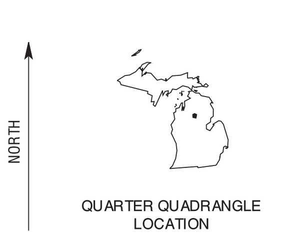

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

12	13	14
21		23
30	31	32

12 LYON MANOR NW
13 LYON MANOR NE
14 ROSCOMMON SOUTH NW
21 LYON MANOR SW
23 ROSCOMMON SOUTH SW
30 PRUDENVILLE NW
31 PRUDENVILLE NE
32 BACKUS LAKE NW

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LYON MANOR SE, MICHIGAN
3.75 MINUTE SERIES
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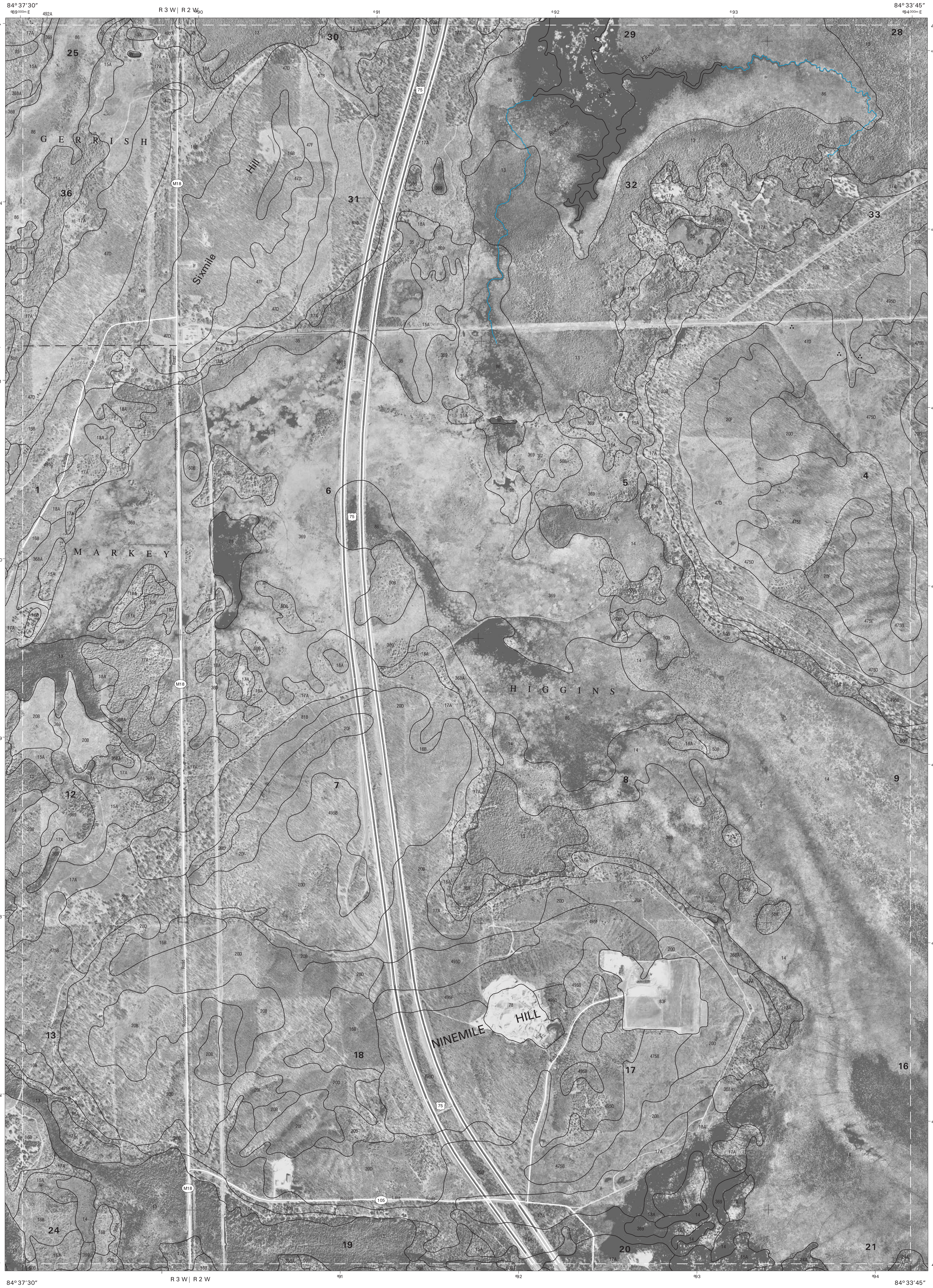
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
ROSCOMMON SOUTH SW QUADRANGLE
SHEET NUMBER 23 OF 63



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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

13	14	15
22		24
31	32	33

13 LYON MANOR NE
14 ROSCOMMON SOUTH NW
15 ROSCOMMON SOUTH NE
22 LYON MANOR SE
24 ROSCOMMON SOUTH SE
31 PRUDENVILLE NE
32 BACKUS LAKE NW
33 BACKUS LAKE NE

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DEPARTMENT OF AGRICULTURE
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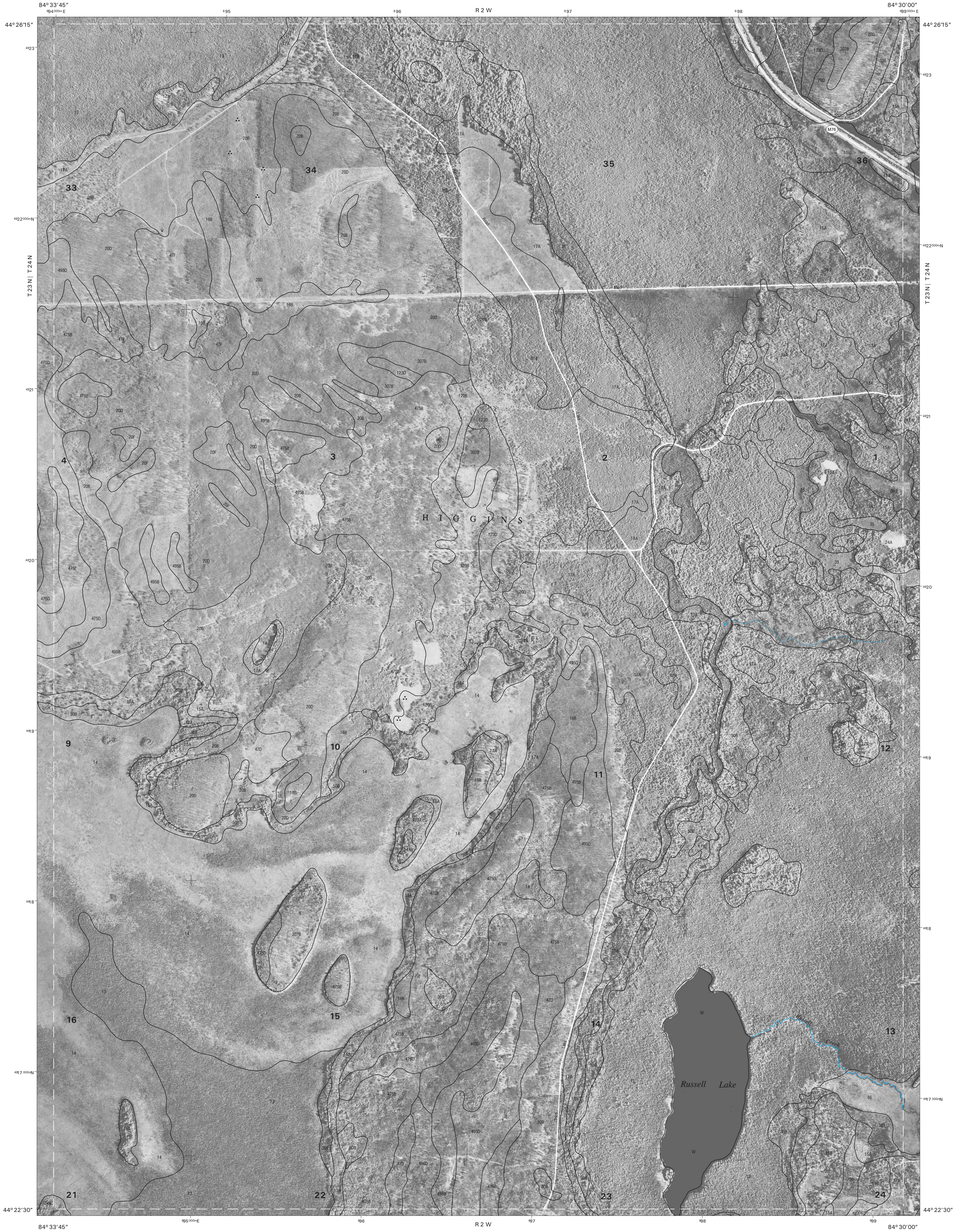
ROSCOMMON COUNTY, MICHIGAN
ROSCOMMON SOUTH SE QUADRANGLE
SHEET NUMBER 24 OF 63



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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

14	15	16
23		25
32	33	34

14 ROSCOMMON SOUTH NW
15 ROSCOMMON SOUTH NE
16 SAINT HELEN NW NW
23 ROSCOMMON SOUTH SW
25 SAINT HELEN NW SW
32 BACKUS LAKE NW
33 BACKUS LAKE NE
34 SAINT HELEN NW

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ROSCOMMON SOUTH SE, MICHIGAN
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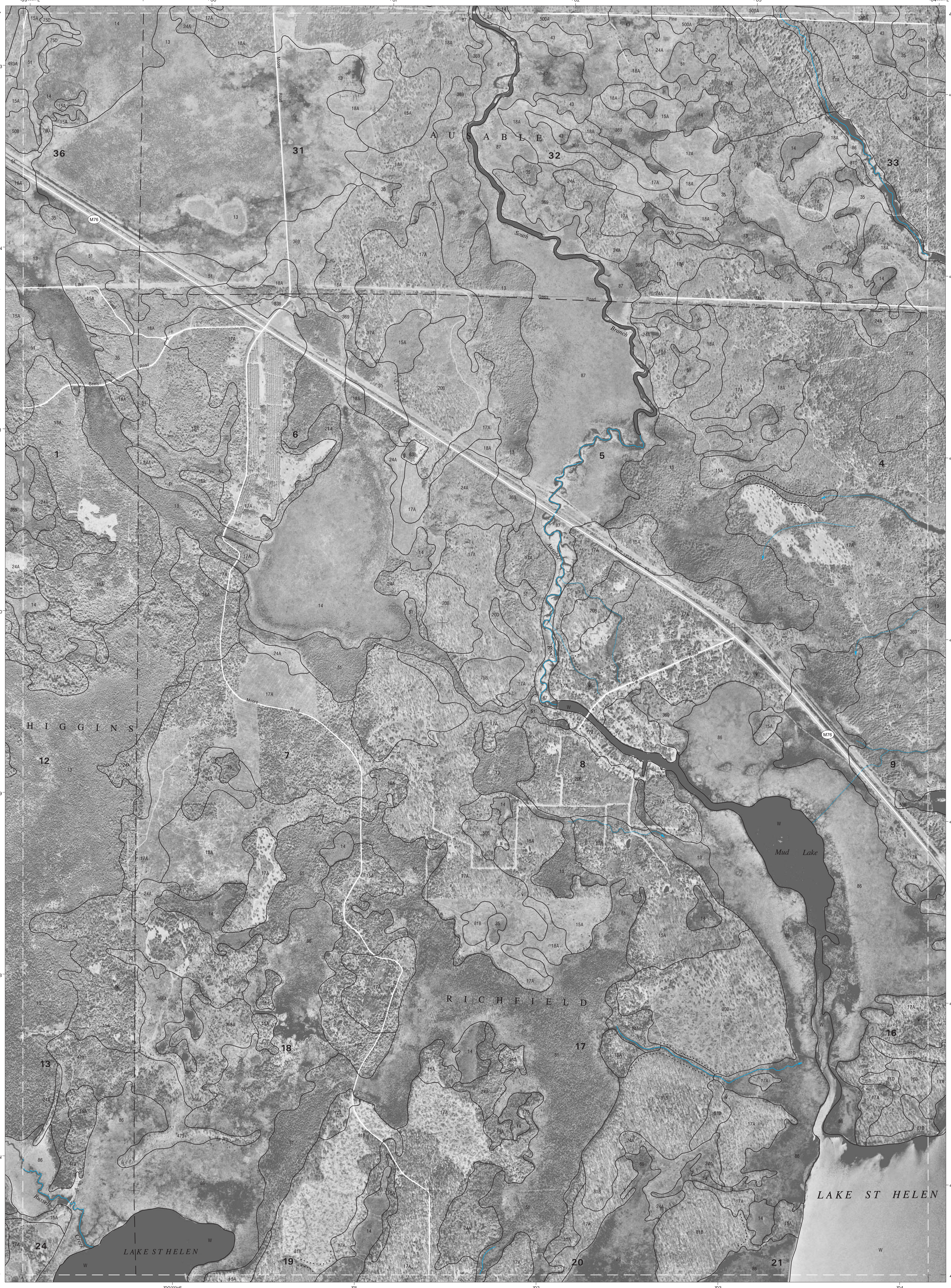
ROSCOMMON COUNTY, MICHIGAN
SAINT HELEN NW SW QUADRANGLE
SHEET NUMBER 25 OF 63

84° 30′00″ R 2 W | R 1 W 84° 26′15″
44° 26′15″ 44° 26′15″



44° 22′30″ 44° 22′30″
84° 30′00″ R 2 W | R 1 W 84° 26′15″

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

15	16	17
24		26
33	34	35

15 ROSCOMMON SOUTH NE
16 SAINT HELEN NW NW
17 SAINT HELEN NW NE
24 ROSCOMMON SOUTH SE
26 SAINT HELEN NW SE
33 BACKUS LAKE NE
34 SAINT HELEN NW
35 SAINT HELEN NE

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SAINT HELEN NW SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 25 OF 63

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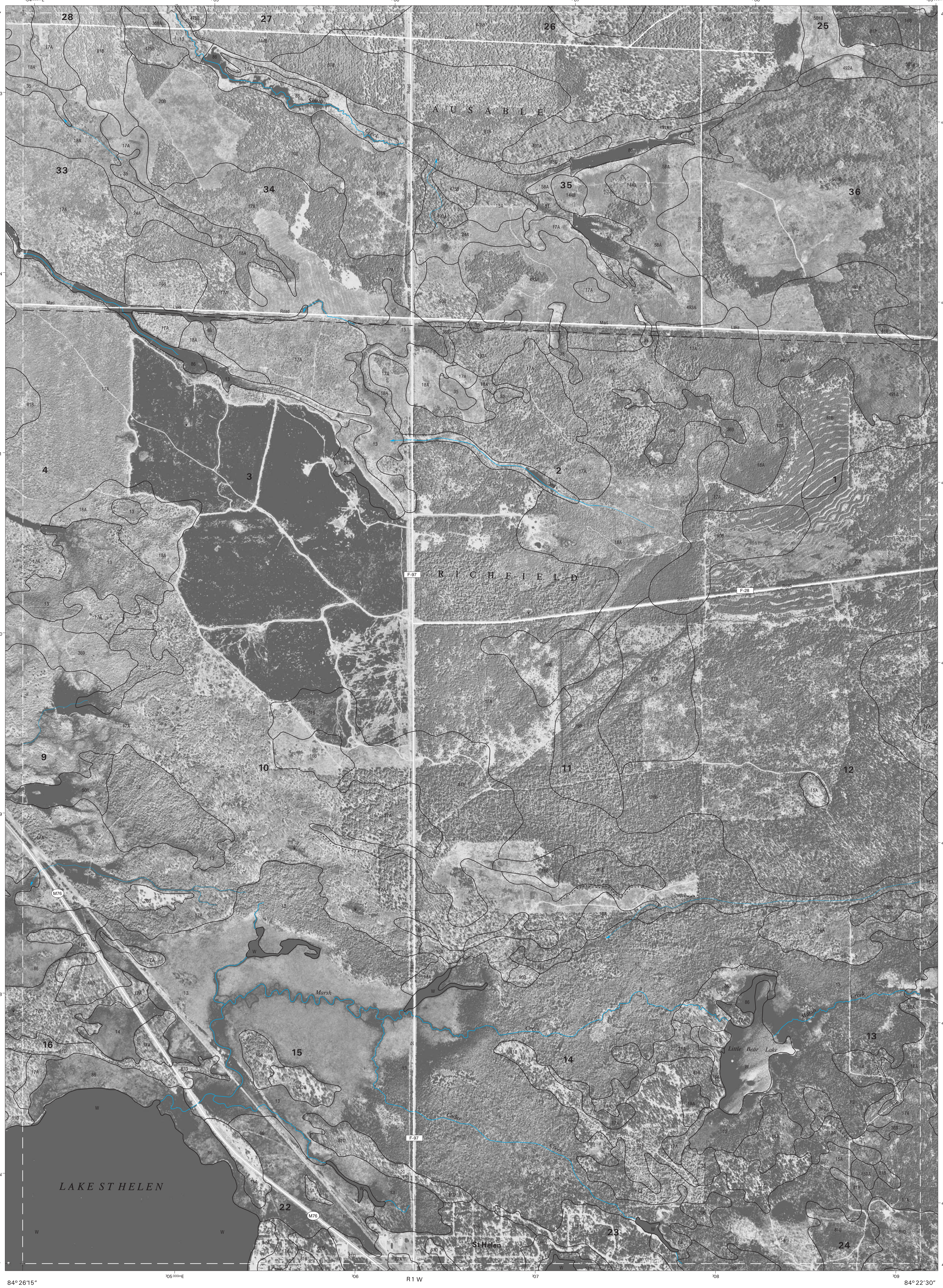
ROSCOMMON COUNTY, MICHIGAN
SAINT HELEN NW SE QUADRANGLE
SHEET NUMBER 26 OF 63



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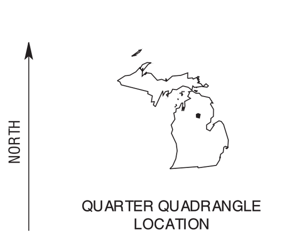

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

16	17	18
25		27
34	35	36

16 SAINT HELEN NW NW
17 SAINT HELEN NW NE
18 SAINT HELEN NE NW (OGEMAW COUNTY)
25 SAINT HELEN NW SW
27 SAINT HELEN NE SW (OGEMAW COUNTY)
34 SAINT HELEN NW
35 SAINT HELEN NE
36 OGEMAW SPRINGS NW (OGEMAW COUNTY)

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SAINT HELEN NW SE, MICHIGAN
3.75 MINUTE SERIES
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ROSCOMMON COUNTY, MICHIGAN
SAINT HELEN NE SW QUADRANGLE
SHEET NUMBER 27 OF 63

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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE
LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

17	18	A
26		B
35	36	C

17 SAINT HELEN NW NE
18 SAINT HELEN NE NW
A SAINT HELEN NE NE (OGEMAW COUNTY)
26 SAINT HELEN NW SE
B SAINT HELEN NE SE (OGEMAW COUNTY)
35 SAINT HELEN NE
36 OGEMAW SPRINGS NW
C OGEMAW SPRINGS NE (OGEMAW COUNTY)

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SAINT HELEN NE SW, MICHIGAN
3.75 MINUTE SERIES
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DEPARTMENT OF AGRICULTURE
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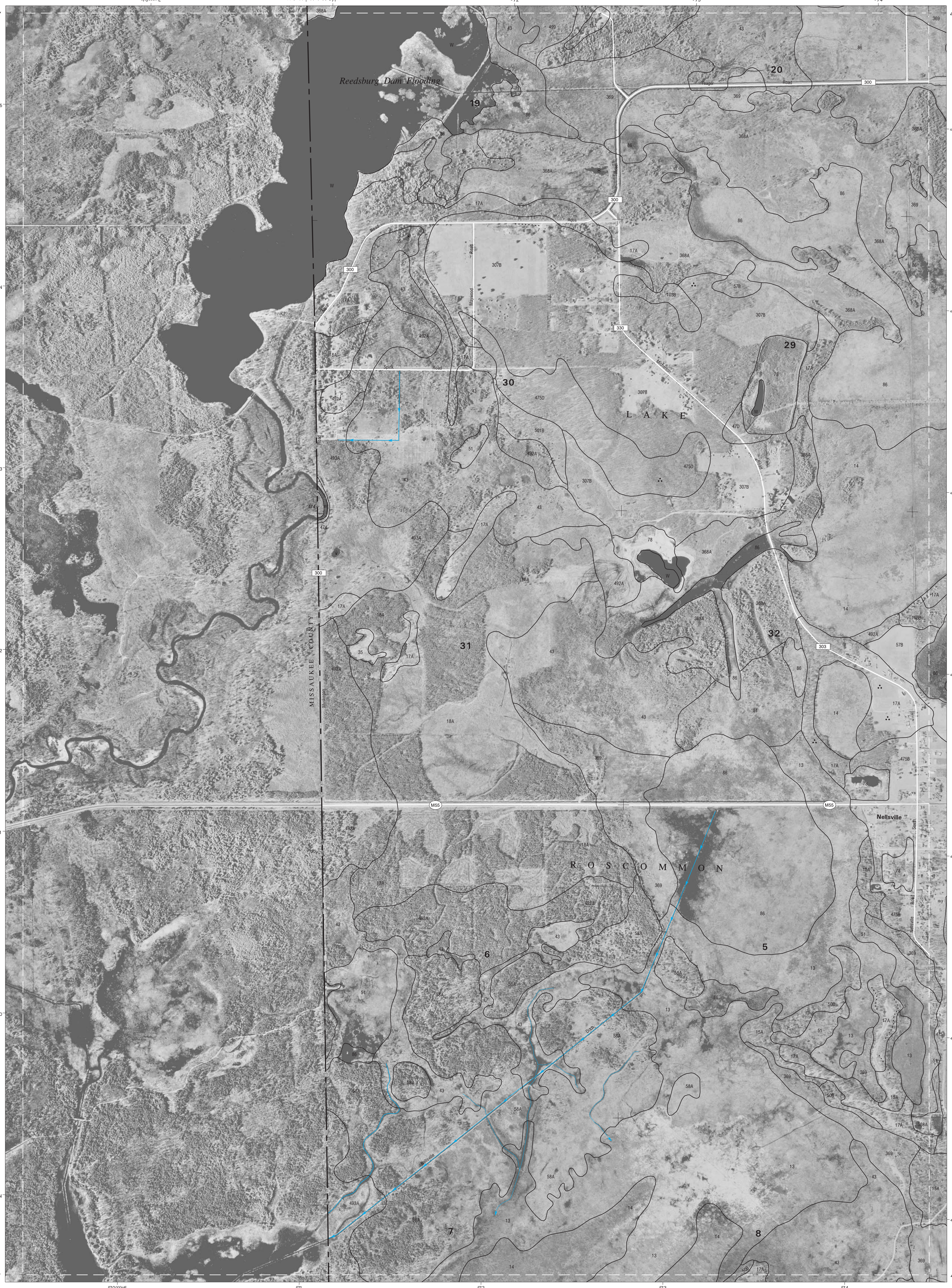
ROSCOMMON COUNTY, MICHIGAN
HOUGHTON LAKE NW QUADRANGLE
SHEET NUMBER 28 OF 63

84° 52′30″ | R 5 W | R 4 W | 84° 48′45″

44° 22′30″



44°18′45″

84° 52′30″ | R 5 W | R 4 W | 84° 48′45″

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS: 0.5 — 0 — 0.5

A	19	20
B		29
C	37	38

A ADDIS CREEK SE (MISSAUKEE COUNTY)
19 MEADS LANDING SW
20 MEADS LANDING SE
B MERRITT NE (MISSAUKEE COUNTY)
29 HOUGHTON LAKE NE
C MERRITT SE (MISSAUKEE COUNTY)
37 HOUGHTON LAKE SW
38 HOUGHTON LAKE SE

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HOUGHTON LAKE NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 28 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
HOUGHTON LAKE NE QUADRANGLE
SHEET NUMBER 29 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

19	20	21
28		30
37	38	39

19 MEADS LANDING SW
20 MEADS LANDING SE
21 LYON MANOR SW
28 HOUGHTON LAKE NW
30 PRUDENVILLE NW
37 HOUGHTON LAKE SW
38 HOUGHTON LAKE SE
39 PRUDENVILLE SW

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ROSCOMMON COUNTY, MICHIGAN
PRUDENVILLE NW QUADRANGLE
SHEET NUMBER 30 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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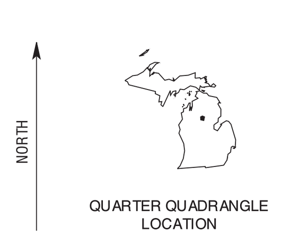
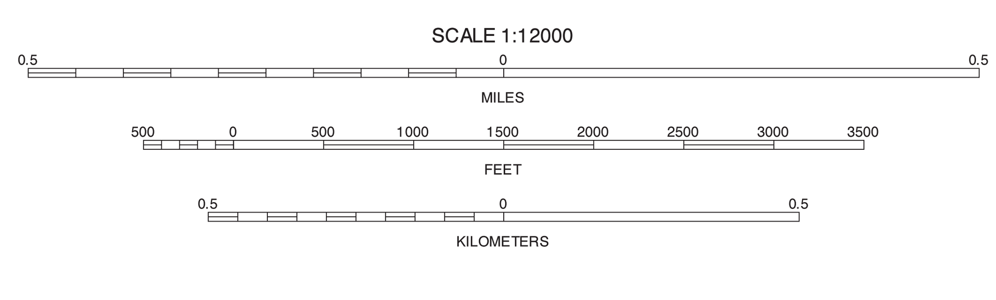


QUARTER QUADRANGLE LOCATION



20	21	22
29		31
38	39	40

20 MEADS LANDING SE
21 LYON MANOR SW
22 LYON MANOR SE
29 HOUGHTON LAKE NE
31 PRUDENVILLE NE
38 HOUGHTON LAKE SE
39 PRUDENVILLE SW
40 PRUDENVILLE SE

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ROSCOMMON COUNTY, MICHIGAN
PRUDENVILLE NE QUADRANGLE
SHEET NUMBER 31 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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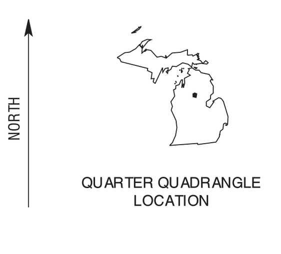

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

21	22	23
30		32
39	40	41

21 LYON MANOR SW
22 LYON MANOR SE
23 ROSCOMMON SOUTH SW
30 PRUDENVILLE NW
32 BACKUS LAKE NW
39 PRUDENVILLE SW
40 PRUDENVILLE SE
41 BACKUS LAKE SW

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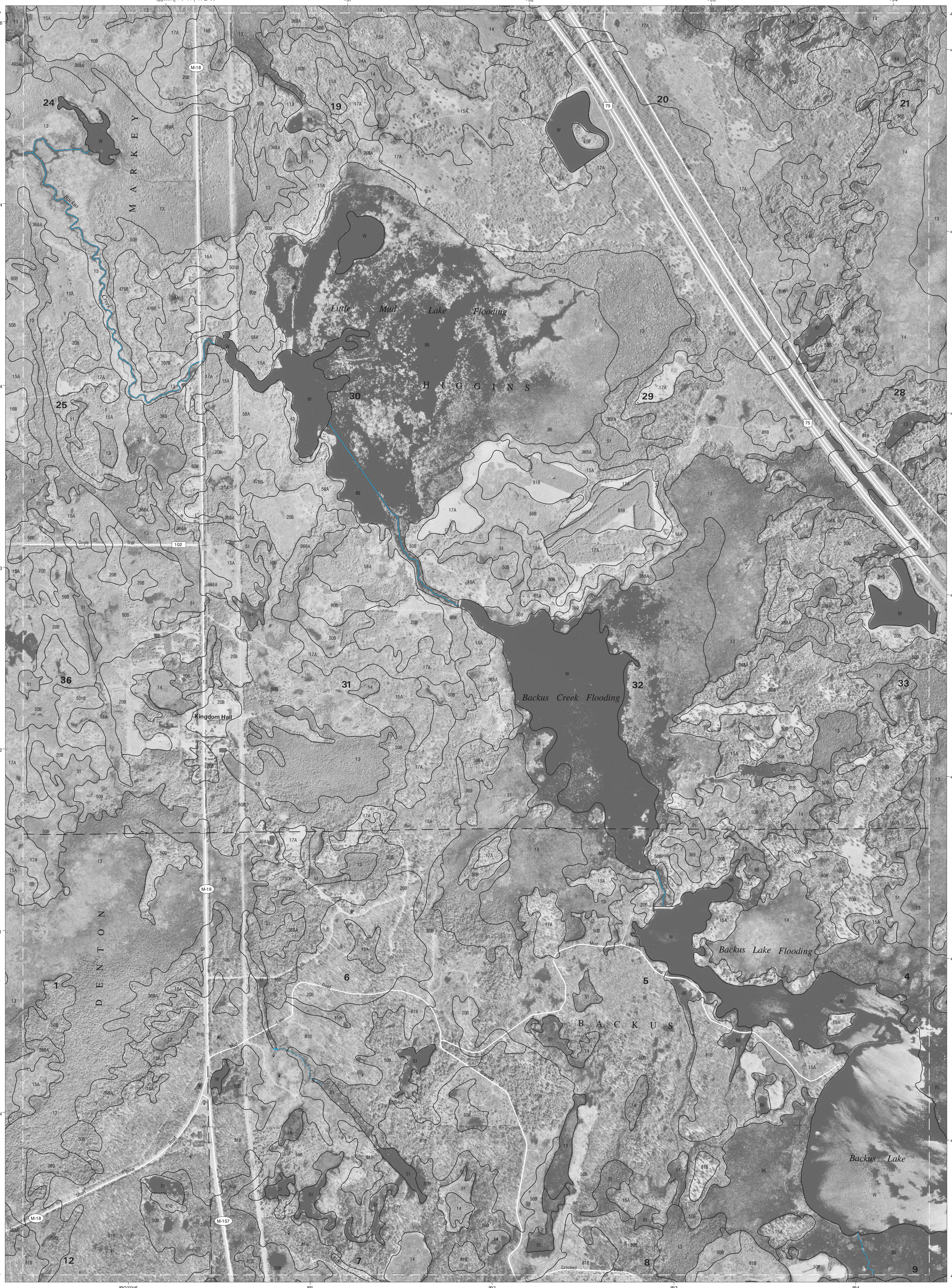
ROSCOMMON COUNTY, MICHIGAN
BACKUS LAKE NW QUADRANGLE
SHEET NUMBER 32 OF 63



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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

22	23	24
31		33
40	41	42

22 LYON MANOR SE
23 ROSCOMMON SOUTH SW
24 ROSCOMMON SOUTH SE
31 PRUDENVILLE NE
33 BACKUS LAKE NE
40 PRUDENVILLE SE
41 BACKUS LAKE SW
42 BACKUS LAKE SE

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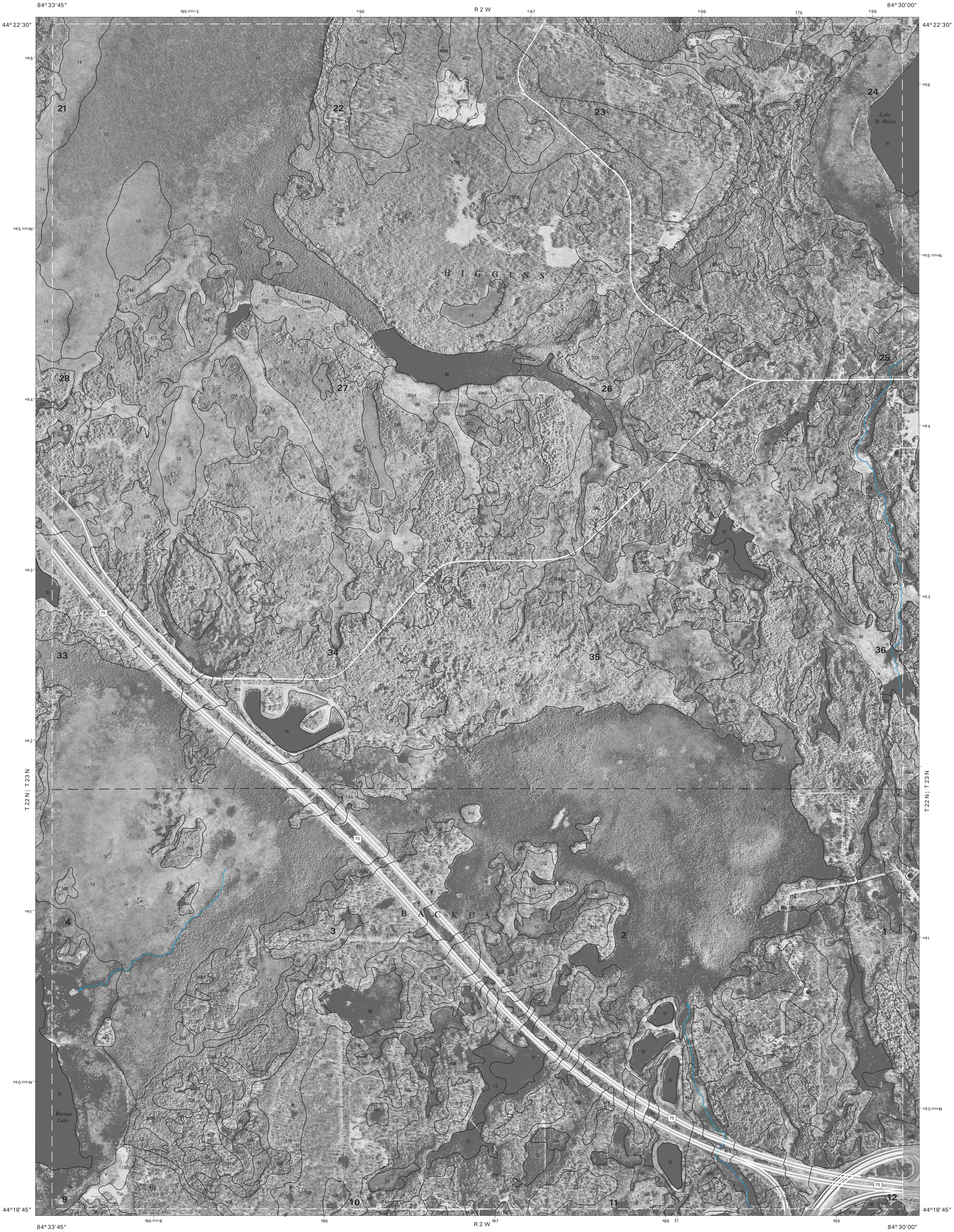
ROSCOMMON COUNTY, MICHIGAN
BACKUS LAKE NE QUADRANGLE
SHEET NUMBER 33 OF 63



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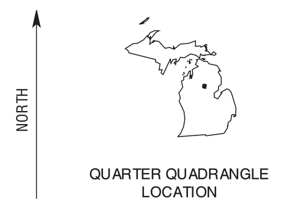

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 — 0 — 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 — 0 — 0.5
KILOMETERS

23	24	25
32		34
41	42	43

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23 ROSCOMMON SOUTH SW
24 ROSCOMMON SOUTH SE
25 SAINT HELEN NW SW
32 BACKUS LAKE NW
34 SAINT HELEN NW
41 BACKUS LAKE SW
42 BACKUS LAKE SE
43 SAINT HELEN SW

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ROSCOMMON COUNTY, MICHIGAN
SAINT HELEN NW QUADRANGLE
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This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

24	25	26
33		35
42	43	44

24 ROSCOMMON SOUTH SE
25 SAINT HELEN NW SW
26 SAINT HELEN NW SE
33 BACKUS LAKE NE
35 SAINT HELEN NE
42 BACKUS LAKE SE
43 SAINT HELEN SW
44 SAINT HELEN SE

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ROSCOMMON COUNTY, MICHIGAN
SAINT HELEN NE QUADRANGLE
SHEET NUMBER 35 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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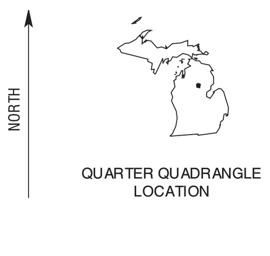

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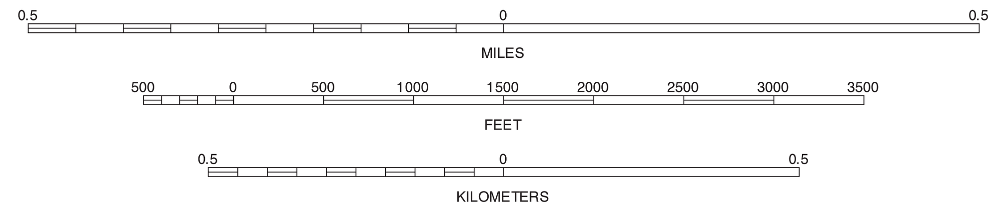

25	26	27
34		36
43	44	45

25 SAINT HELEN NW SW
26 SAINT HELEN NW SE
27 SAINT HELEN NE SW
34 SAINT HELEN NW
36 OGEMAW SPRINGS NW
43 SAINT HELEN SW
44 SAINT HELEN SE
45 OGEMAW SPRINGS SW

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ROSCOMMON COUNTY, MICHIGAN
OGEMAW SPRINGS NW QUADRANGLE
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This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

26	27	A
35		B
44	45	C

26 SAINT HELEN NW SE
27 SAINT HELEN NE SW
A WEST BRANCH NW (OGEMAW COUNTY)
35 SAINT HELEN NE
B OGEMAW SPRINGS NE (OGEMAW COUNTY)
44 SAINT HELEN SE
45 OGEMAW SPRINGS SW
C OGEMAW SPRINGS SE (OGEMAW COUNTY)

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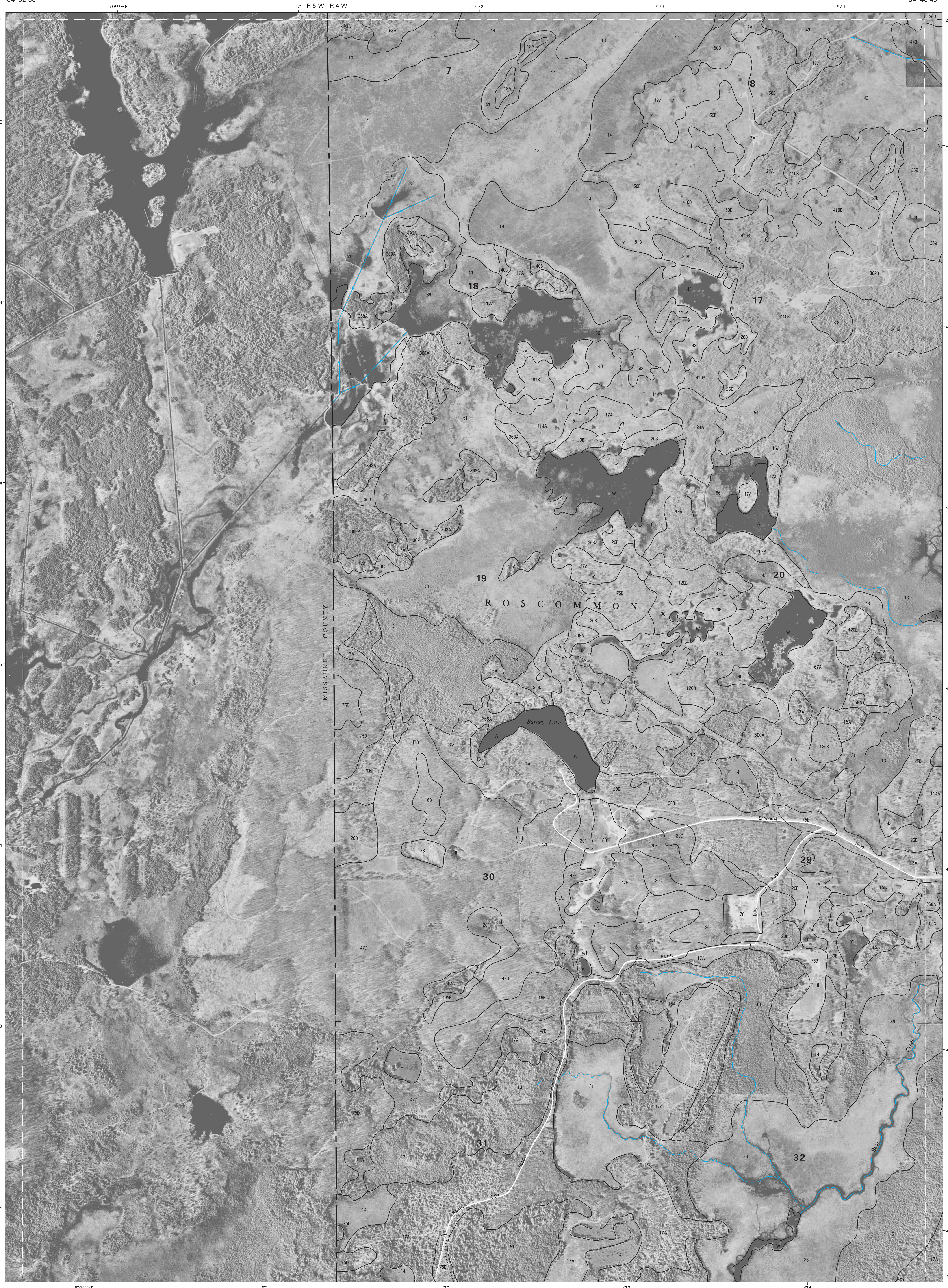
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

A	28	29
B		38
C	46	47

A MERRITT NE (MISSAUKEE COUNTY)
28 HOUGHTON LAKE NW
29 HOUGHTON LAKE NE
B MERRITT SE (MISSAUKEE COUNTY)
38 HOUGHTON LAKE SE
C MODDERSVILLE NE (MISSAUKEE COUNTY)
46 COOPERTON NW
47 COOPERTON NE

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HOUGHTON LAKE SW, MICHIGAN

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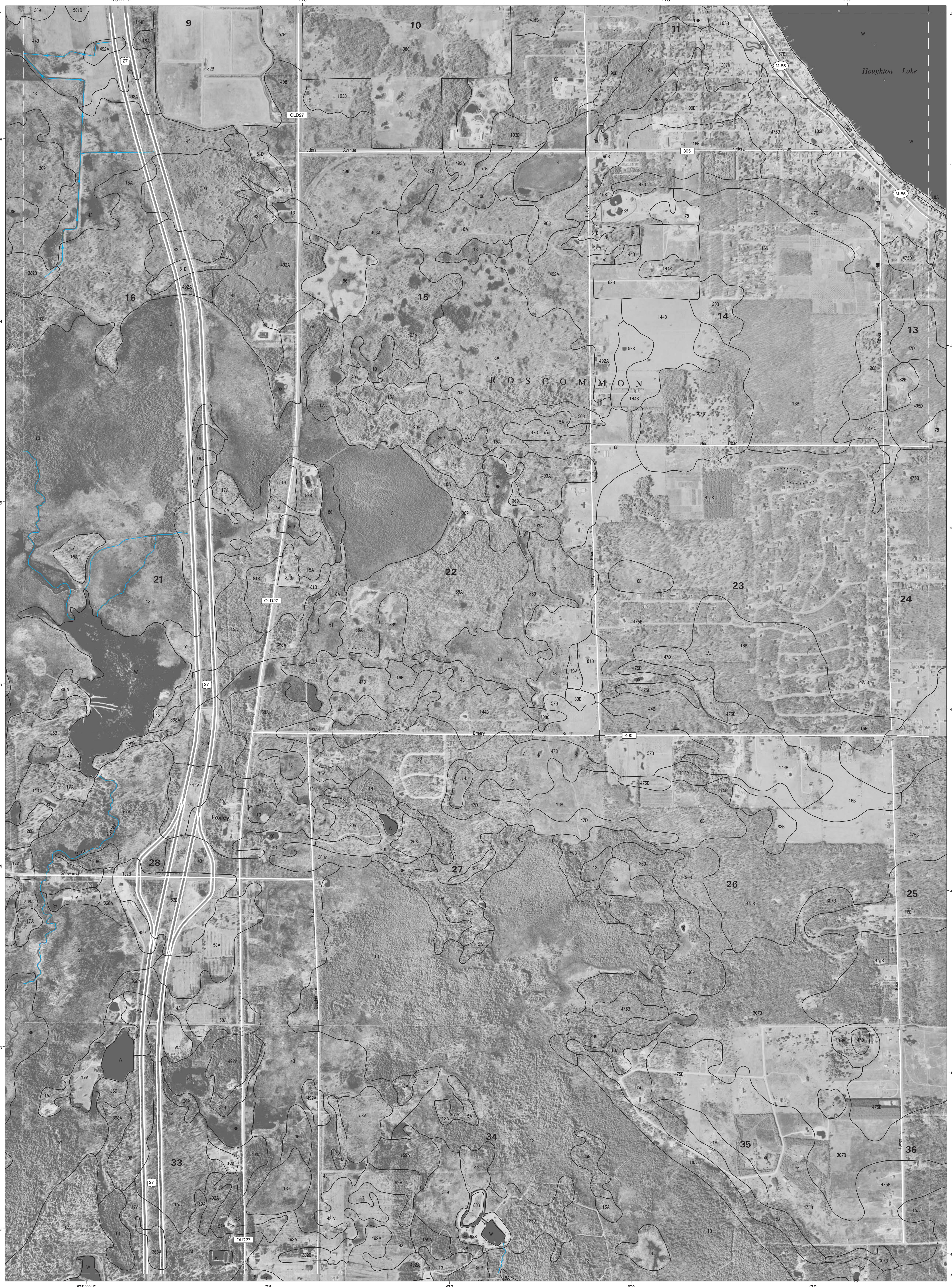
ROSCOMMON COUNTY, MICHIGAN
HOUGHTON LAKE SE QUADRANGLE
SHEET NUMBER 38 OF 63



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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

28	29	30
37		39
46	47	48

28 HOUGHTON LAKE NW
29 HOUGHTON LAKE NE
30 PRUDENVILLE NW
37 HOUGHTON LAKE SW
39 PRUDENVILLE SW
46 COOPERTON NW
47 COOPERTON NE
48 MEREDITH NW NW

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ROSCOMMON COUNTY, MICHIGAN
PRUDENVILLE SW QUADRANGLE
SHEET NUMBER 39 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

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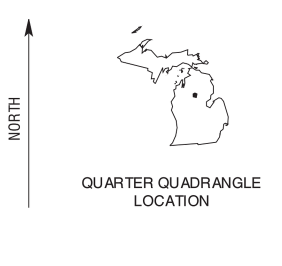

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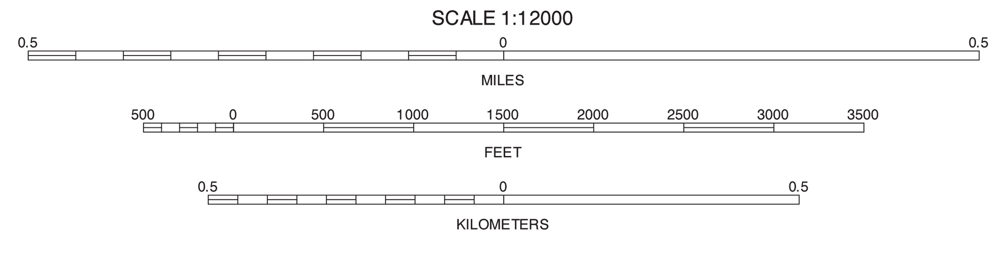

29	30	31
38		40
47	48	49

29 HOUGHTON LAKE NE
30 PRUDENVILLE NW
31 PRUDENVILLE NE
38 HOUGHTON LAKE SE
40 PRUDENVILLE SE
47 COOPERTON NE
48 MEREDITH NW NW
49 MEREDITH NW NE

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ROSCOMMON COUNTY, MICHIGAN
PRUDENVILLE SE QUADRANGLE
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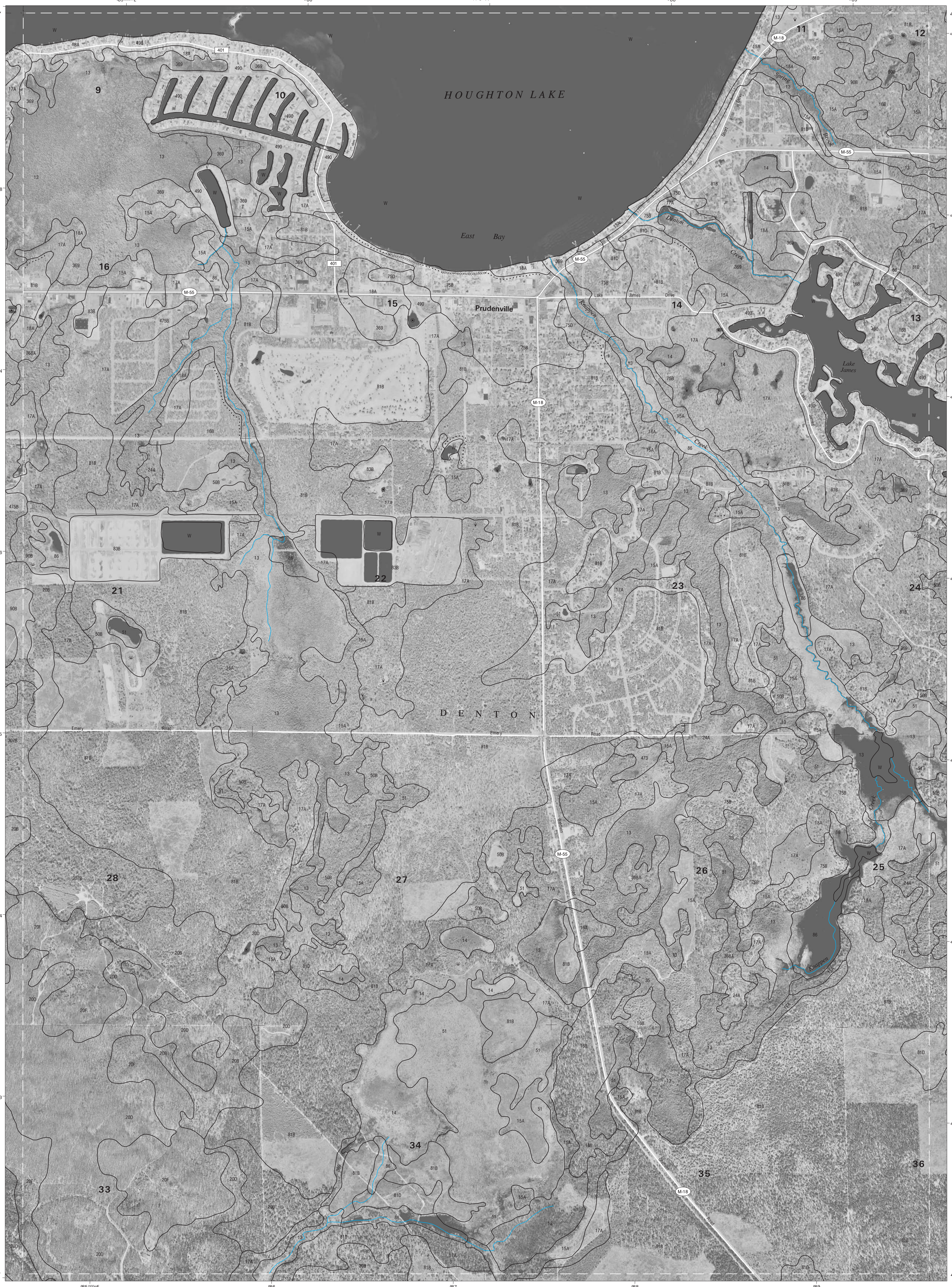

84° 41′15″ R 3 W 84° 37′30″

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

30	31	32
39		41
48	49	50

30 PRUDENVILLE NW
31 PRUDENVILLE NE
32 BACKUS LAKE NW
39 PRUDENVILLE SW
41 BACKUS LAKE SW
48 MEREDITH NW NW
49 MEREDITH NW NE
50 MEREDITH NW

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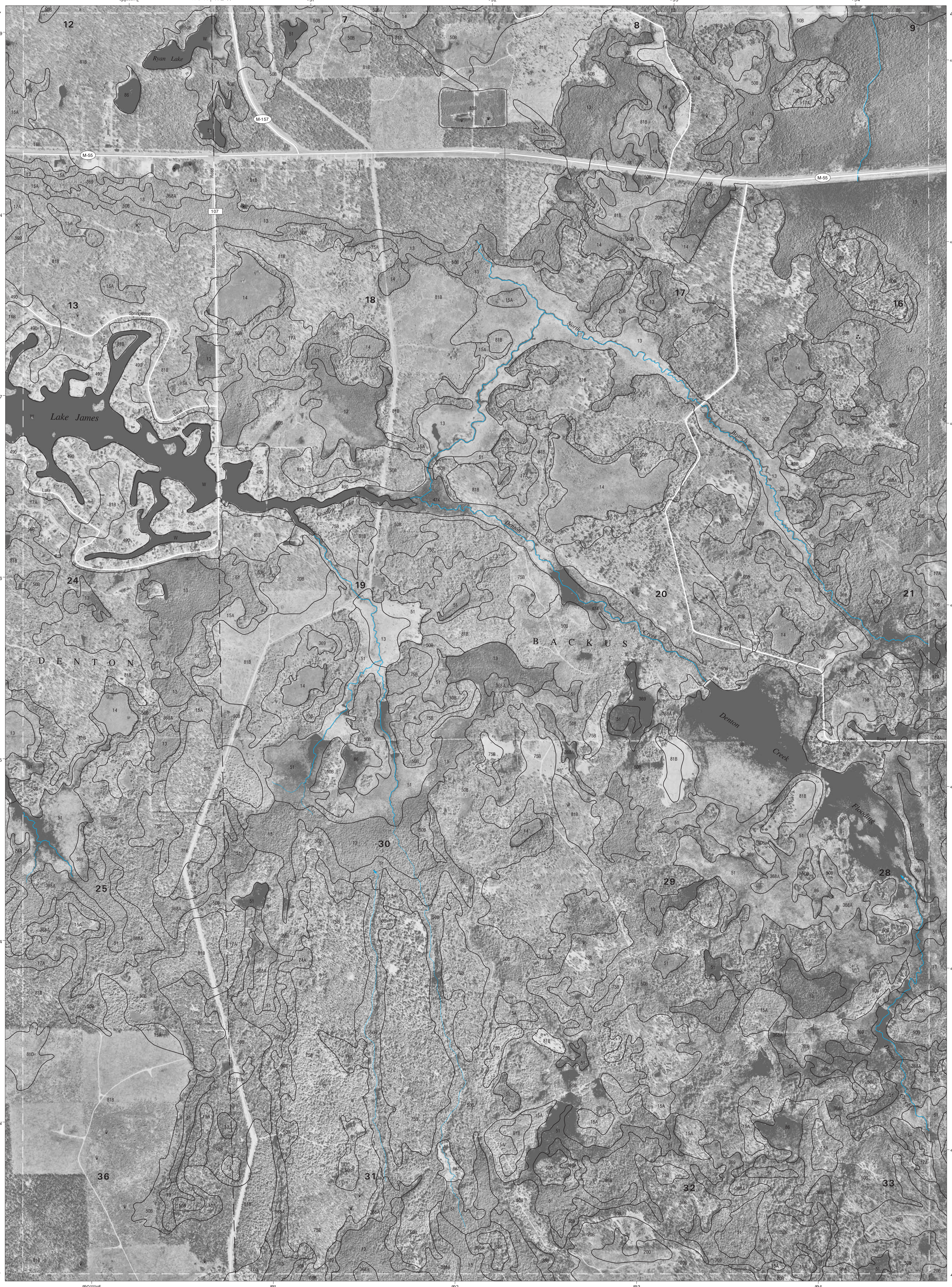
ROSCOMMON COUNTY, MICHIGAN
BACKUS LAKE SW QUADRANGLE
SHEET NUMBER 41 OF 63

84° 37′30″ — R 3 W | R 2 W — 84° 33′45″

44°18′45″ — 44°18′45″



44°15′00″ — 44°15′00″

84° 37′30″ — R 3 W | R 2 W — 84° 33′45″

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 — 0 — 0.5
MILES

500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500
FEET

0.5 — 0 — 0.5
KILOMETERS

31	32	33
40		42
49	50	51

31 PRUDENVILLE NE
32 BACKUS LAKE NW
33 BACKUS LAKE NE
40 PRUDENVILLE SE
42 BACKUS LAKE SE
49 MEREDITH NW NE
50 MEREDITH NW
51 MEREDITH NE

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BACKUS LAKE SE QUADRANGLE
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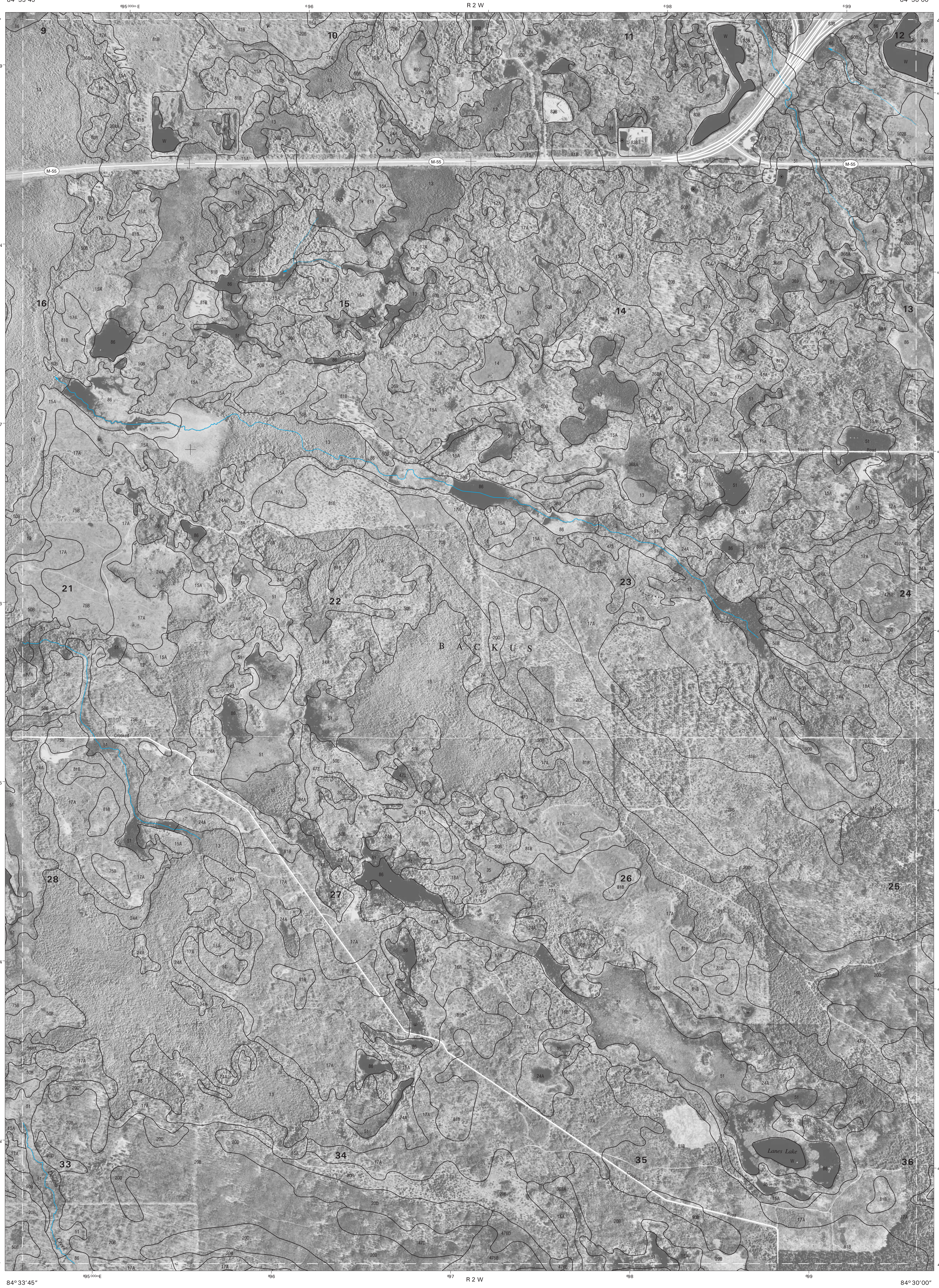

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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS 0.5 0 0.5

32	33	34
41		43
50	51	52

32 BACKUS LAKE NW
33 BACKUS LAKE NE
34 SAINT HELEN NW
41 BACKUS LAKE SW
43 SAINT HELEN SW
50 MEREDITH NW
51 MEREDITH NE
52 BUTMAN NW

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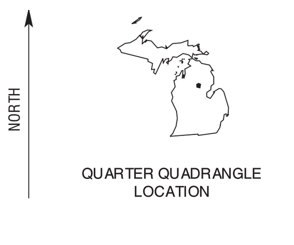
ROSCOMMON COUNTY, MICHIGAN
SAINT HELEN SW QUADRANGLE
SHEET NUMBER 43 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

33	34	35
42		44
51	52	53

33 BACKUS LAKE NE
34 SAINT HELEN NW
35 SAINT HELEN NE
42 BACKUS LAKE SE
44 SAINT HELEN SE
51 MEREDITH NE
52 BUTMAN NW
53 BUTMAN NE

INDEX TO ADJOINING 3.75 MAPS

SAINT HELEN SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 43 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
SAINT HELEN SE QUADRANGLE
SHEET NUMBER 44 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

34	35	36
43		45
52	53	54

34 SAINT HELEN NW
35 SAINT HELEN NE
36 OGEMAW SPRINGS NW (OGEMAW COUNTY)
43 SAINT HELEN SW
45 OGEMAW SPRINGS SW (OGEMAW COUNTY)
52 BUTMAN NW
53 BUTMAN NE
54 EDWARDS NW (OGEMAW COUNTY)

INDEX TO ADJOINING 3.75 MAPS

SAINT HELEN SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 44 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
OGEMAW SPRINGS SW QUADRANGLE
SHEET NUMBER 45 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

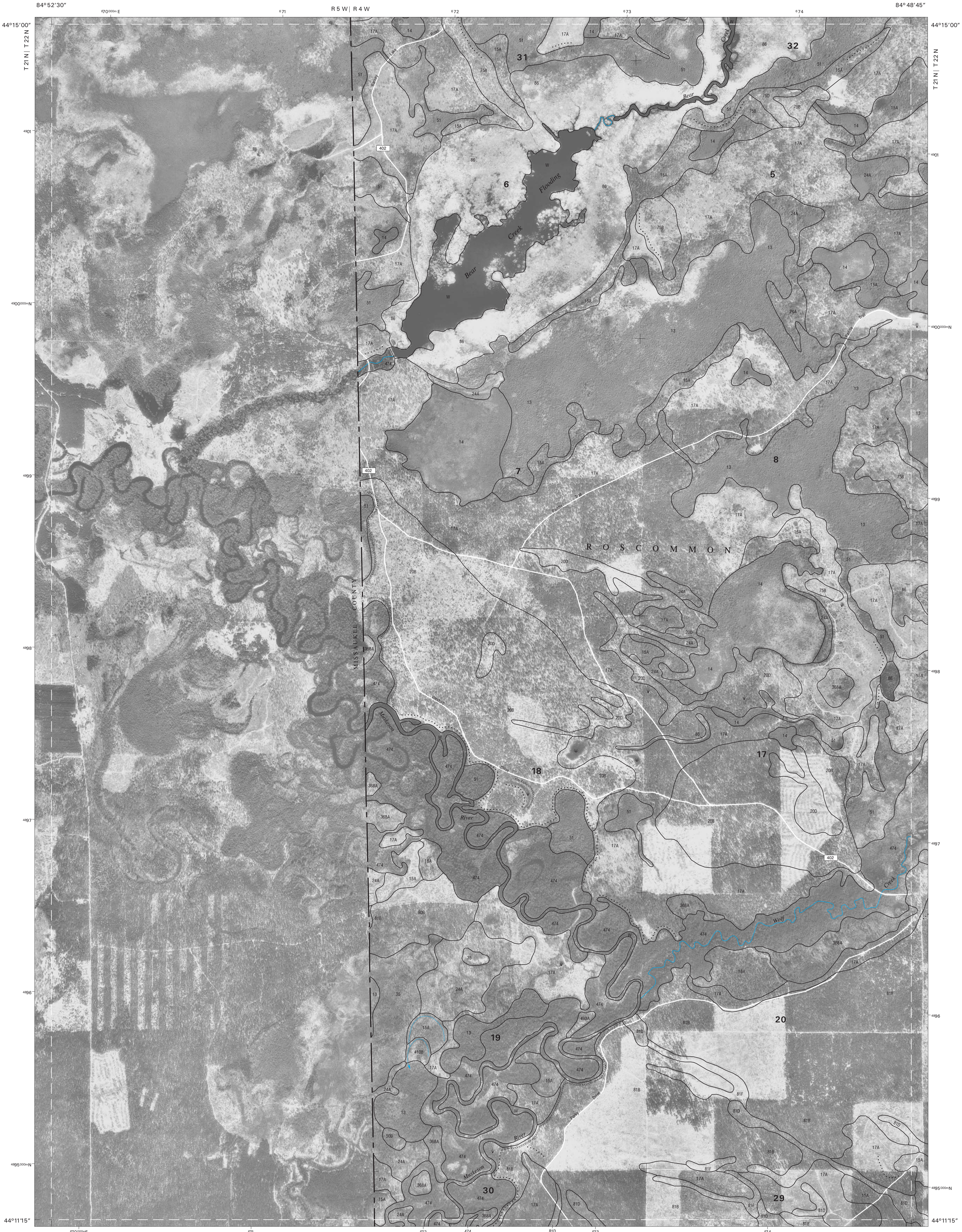
35	36	A
44		B
53	54	C

35 SAINT HELEN NE
36 OGEMAW SPRINGS NW
A OGEMAW SPRINGS NE (OGEMAW COUNTY)
44 SAINT HELEN SE
B OGEMAW SPRINGS SE
53 BUTMAN NE
54 EDWARDS NW
C EDWARDS NE (OGEMAW COUNTY)

INDEX TO ADJOINING 3.75 MAPS

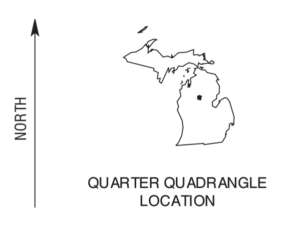
OGEMAW SPRINGS SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 45 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

A	37	38
B		47
C	55	56

A MERRITT SE (MISSAUKEE COUNTY)
37 HOUGHTON LAKE SW
38 HOUGHTON LAKE SE
B MODDERSVILLE NE (MISSAUKEE COUNTY)
47 COOPERTON NE
C MODDERSVILLE SE (MISSAUKEE COUNTY)
55 COOPERTON SW
56 COOPERTON SE

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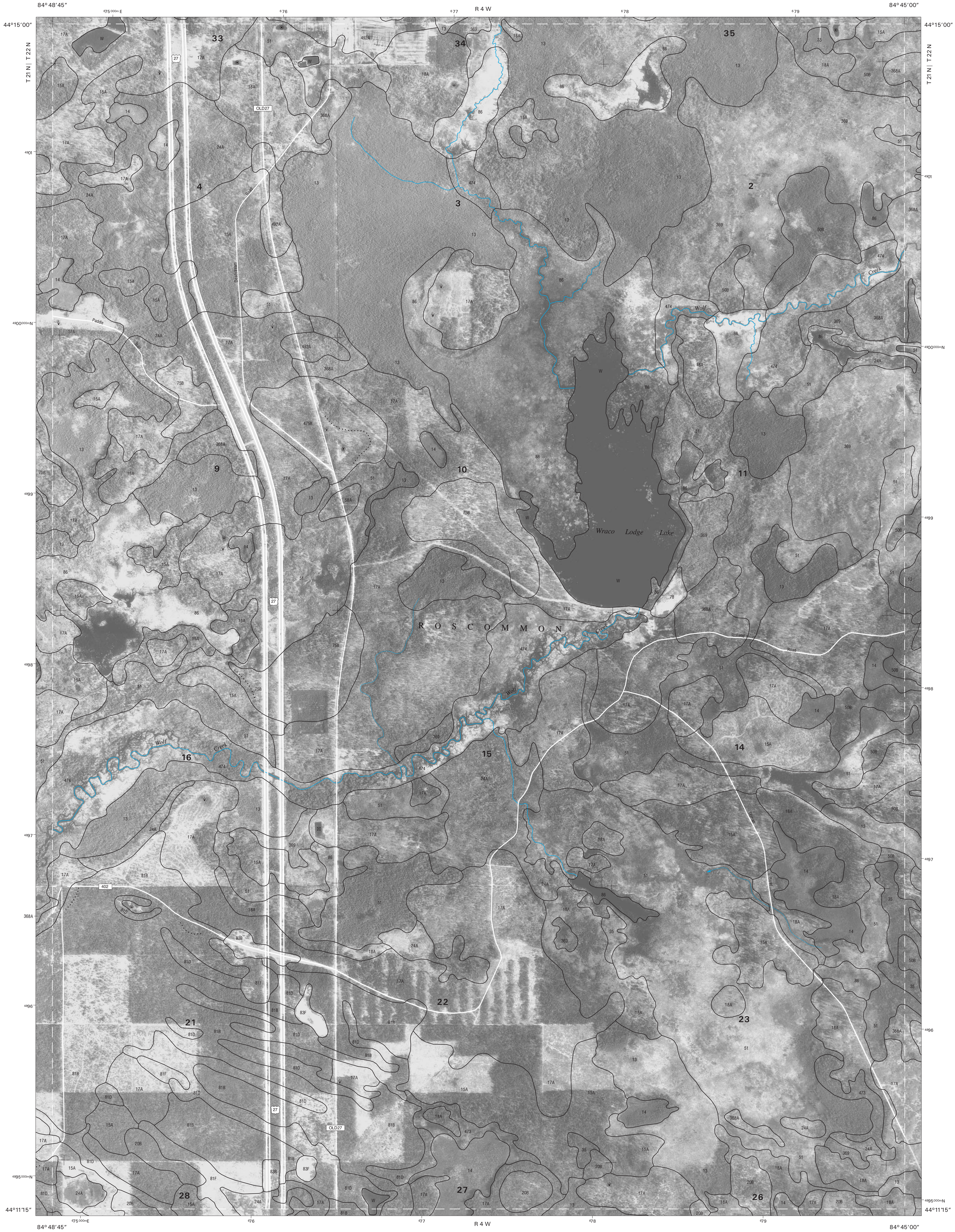
COOPERTON NW, MICHIGAN

3.75 MINUTE SERIES
SHEET NUMBER 46 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

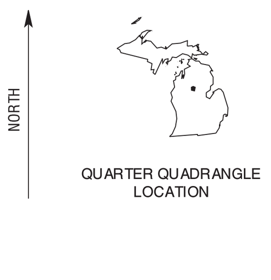
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
COOPERTON NE QUADRANGLE
SHEET NUMBER 47 OF 63



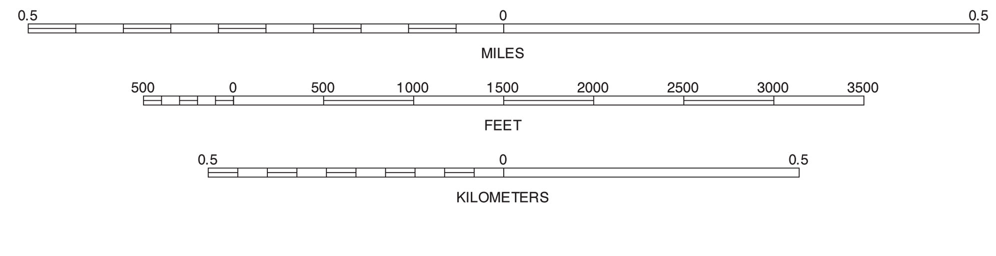
This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000



37	38	39
46		48
55	56	57

37 HOUGHTON LAKE SW
38 HOUGHTON LAKE SE
39 PRUDENVILLE SW
46 COOPERTON NW
48 MEREDITH NW NW
55 COOPERTON SW
56 COOPERTON SE
57 MERDITH NW SW

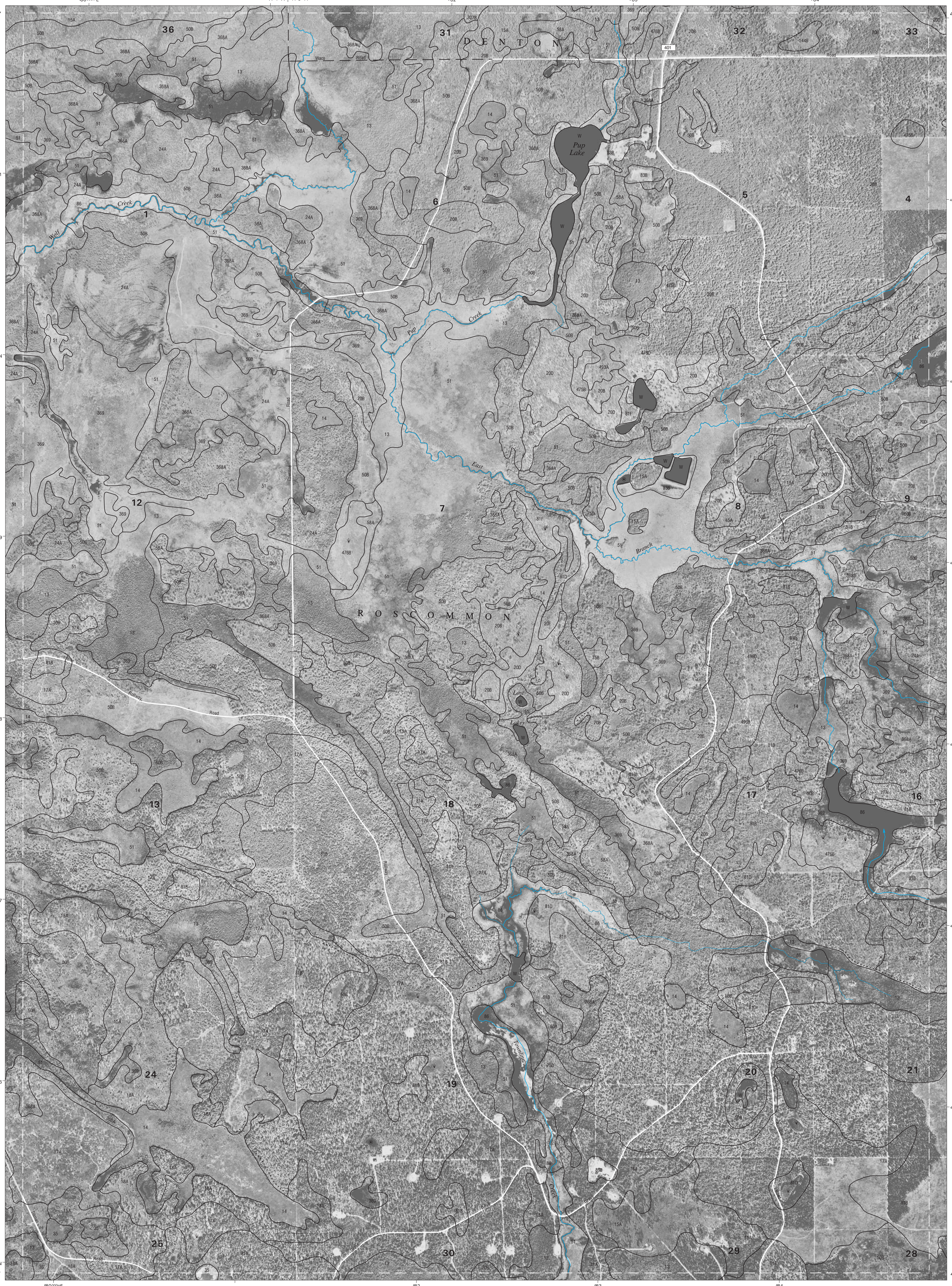
INDEX TO ADJOINING 3.75 MAPS

COOPERTON NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 47 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

84° 45′00″ | R 4 W | R 3 W | 84° 41′15″

44°15′00″ | T 21 N | T 22 N | 44°15′00″



44°11′15″ | 84° 45′00″ | R 4 W | R 3 W | 84° 41′15″ | 44°11′15″

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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

38	39	40
47		49
56	57	58

38 HOUGHTON LAKE SE
39 PRUDENVILLE SW
40 PRUDENVILLE SE
47 COOPERTON NE
49 MEREDITH NW NE
56 COOPERTON SE
57 MEREDITH NW SW
58 MEREDITH NW SE

INDEX TO ADJOINING 3.75 MAPS

MEREDITH NW NW, MICHIGAN

3.75 MINUTE SERIES
SHEET NUMBER 48 OF 63

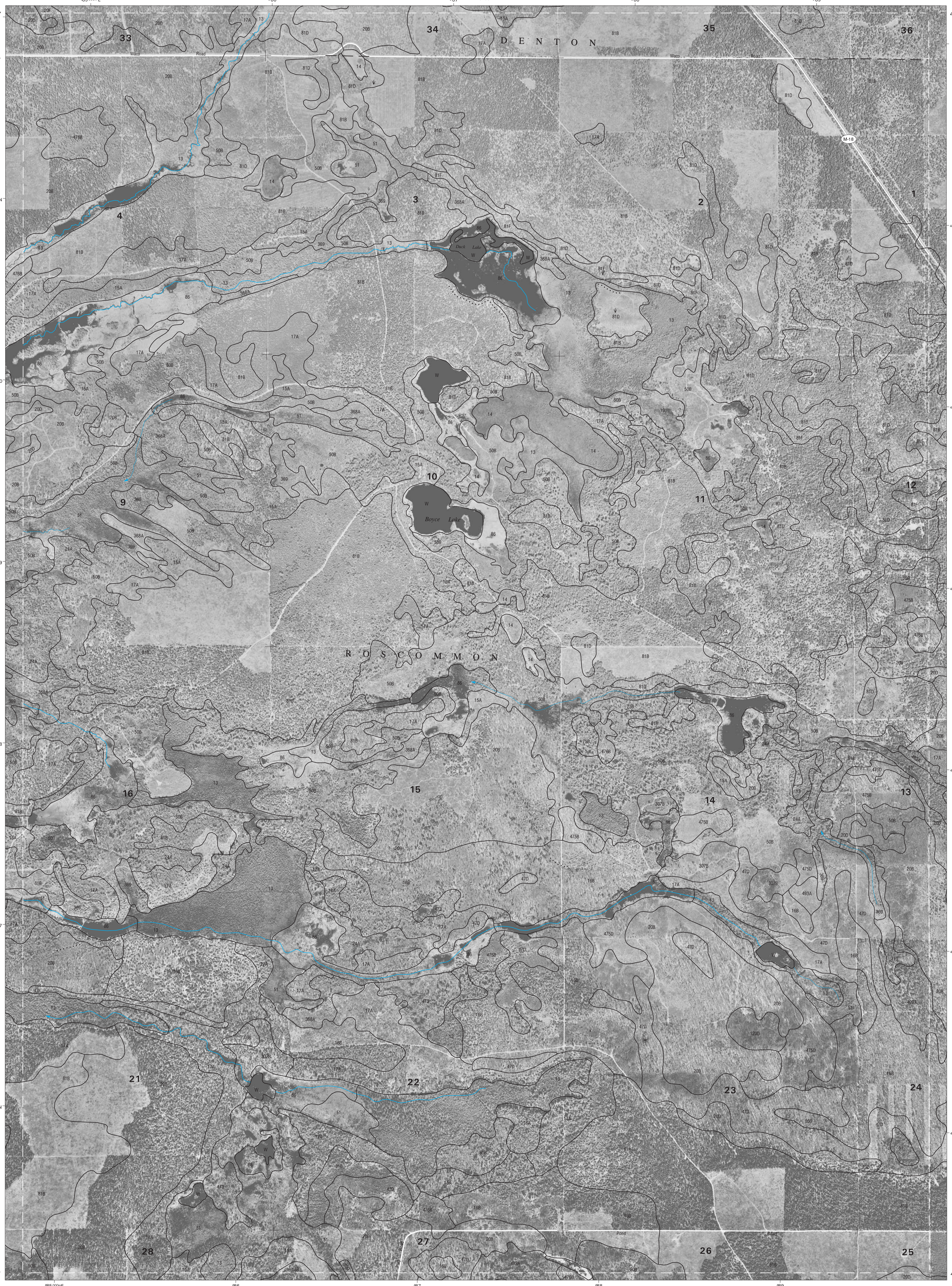
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
MEREDITH NW NE QUADRANGLE
SHEET NUMBER 49 OF 63

84° 41'15" R 3 W 84° 37'30"

44°15'00" 44°15'00"



44°11'15" 44°11'15"

84° 41'15" R 3 W 84° 37'30"

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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

39	40	41
48		50
57	58	59

39 PRUDENVILLE SW
40 PRUDENVILLE SE
41 BACKUS LAKE SW
48 MEREDITH NW NW
50 MEREDITH NW
57 MEREDITH NW SW
58 MEREDITH NW SE
59 MEREDITH SW

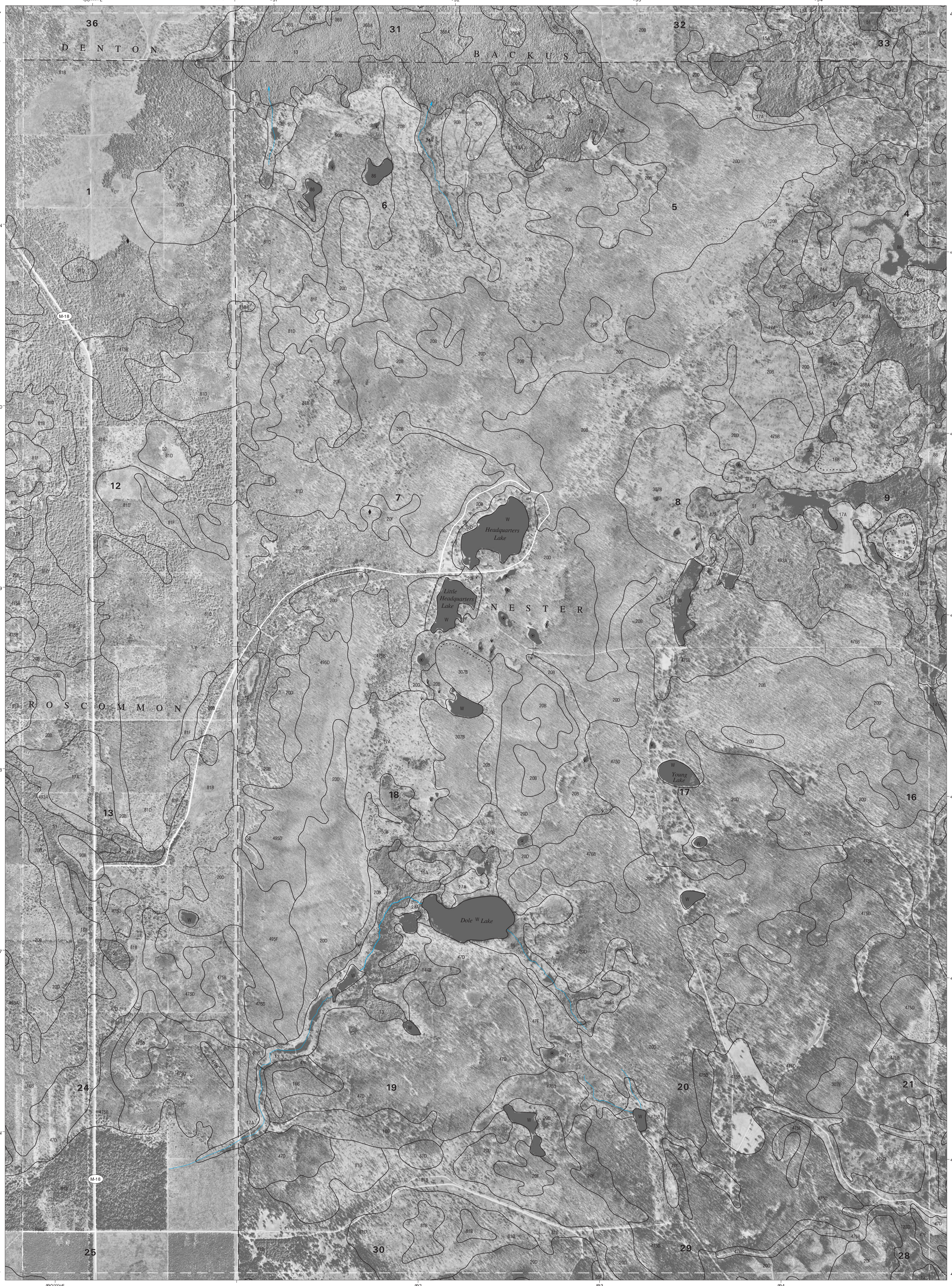
INDEX TO ADJOINING 3.75 MAPS

MEREDITH NW NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 49 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
MEREDITH NW QUADRANGLE
SHEET NUMBER 50 OF 63



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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS: 0.5 — 0 — 0.5

40	41	42
49		51
58	59	60

40 PRUDENVILLE SE
41 BACKUS LAKE SW
42 BACKUS LAKE SE
49 MEREDITH NW NE
51 MEREDITH NE
58 MEREDITH NW SE
59 MEREDITH SW
60 MEREDITH SE

INDEX TO ADJOINING 3.75 MAPS

MEREDITH NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 50 OF 63

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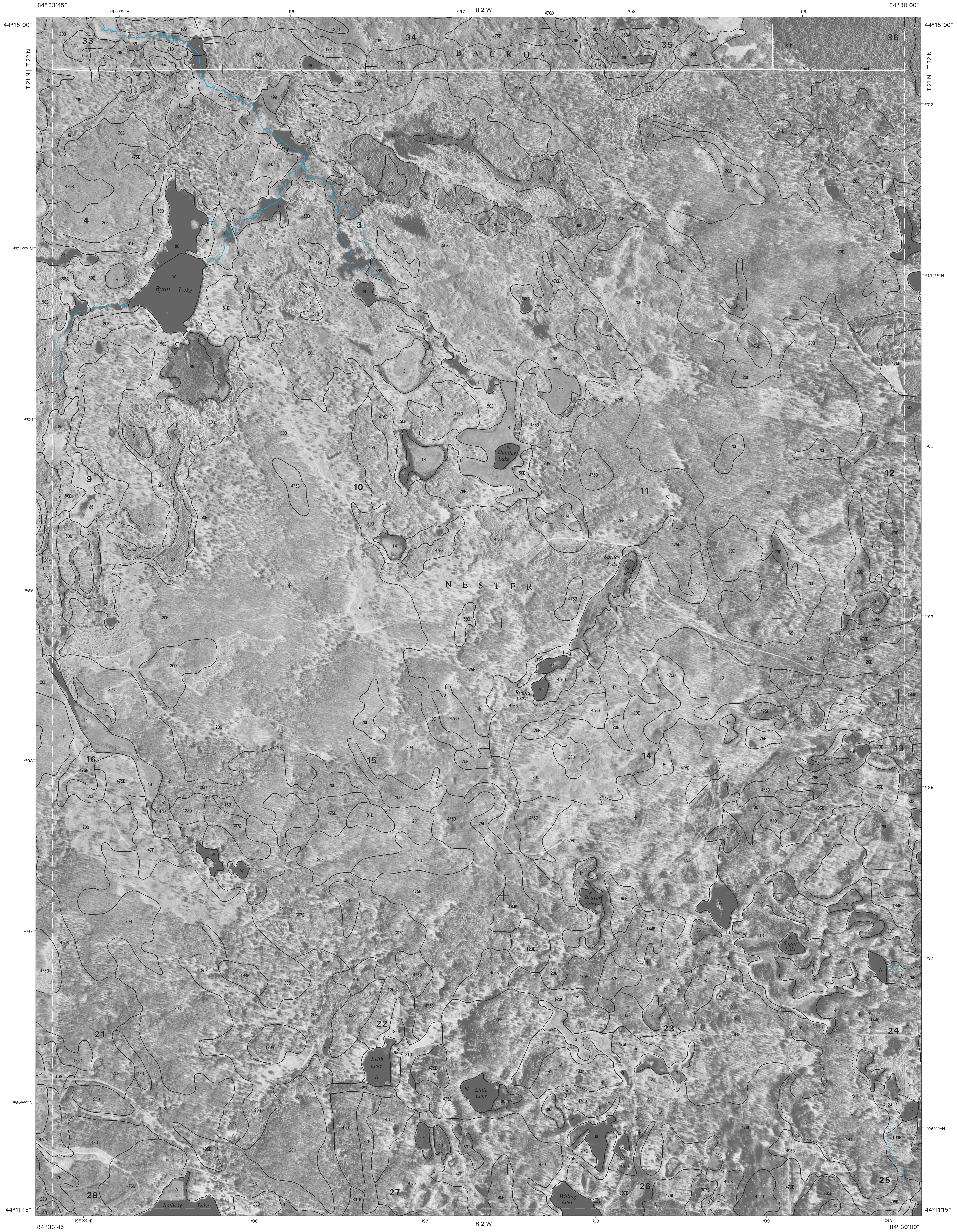
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
MEREDITH NE QUADRANGLE
SHEET NUMBER 51 OF 63



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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

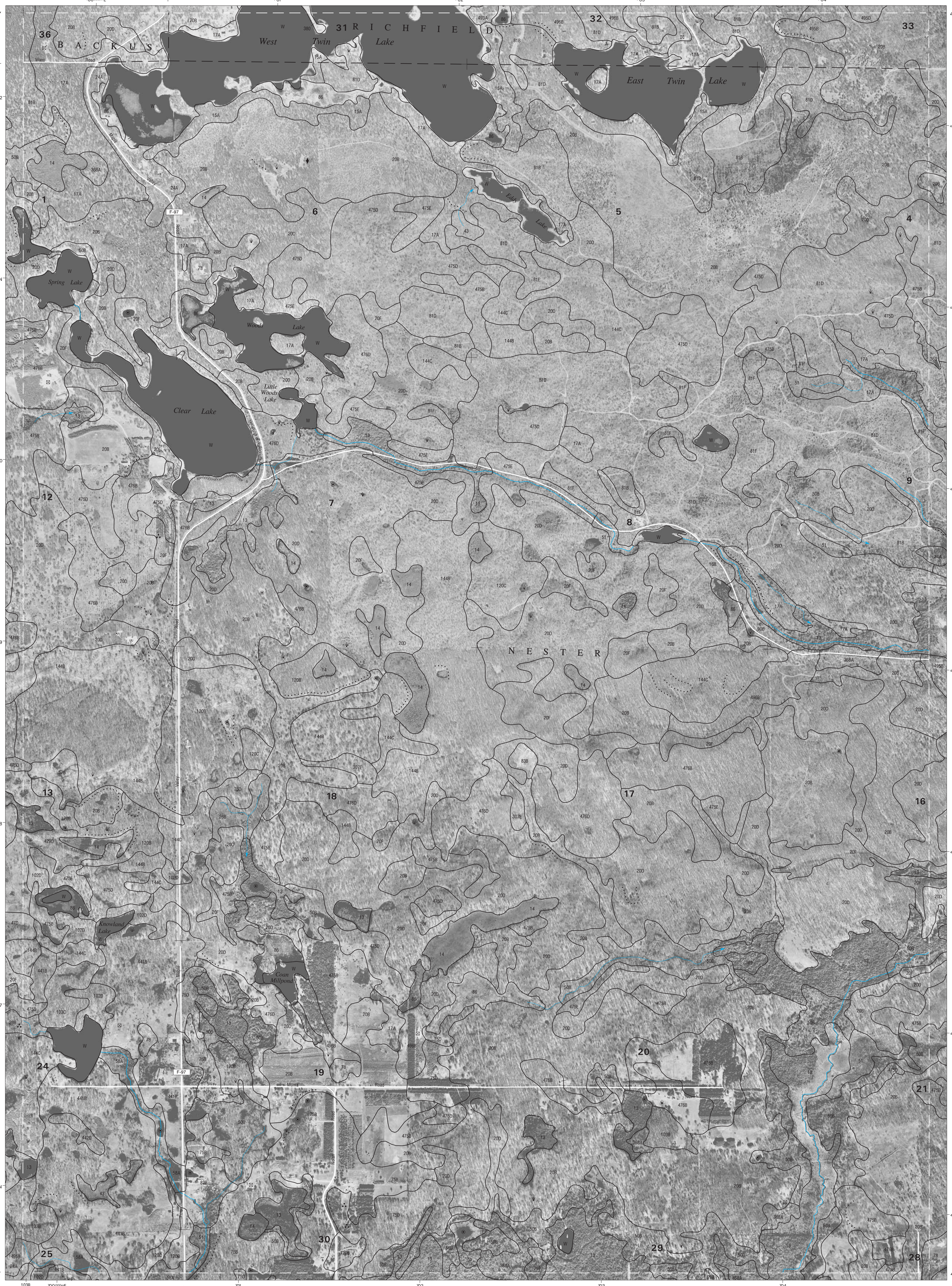
41	42	43
50		52
59	60	61

41 BACKUS LAKE SW
42 BACKUS LAKE SE
43 SAINT HELEN SW
50 MEREDITH NW
52 BUTMAN NW
59 MEREDITH SW
60 MEREDITH SE
61 BUTMAN SW

INDEX TO ADJOINING 3.75 MAPS

MEREDITH NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 51 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.



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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE
LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

42	43	44
51		53
60	61	62

42 BACKUS LAKE SE
43 SAINT HELEN SW
44 SAINT HELEN SE
51 MEREDITH NE
53 BUTMAN NE
60 MEREDITH SE
61 BUTMAN SW
62 BUTMAN SE

INDEX TO ADJOINING 3.75 MAPS

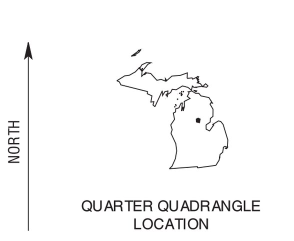
BUTMAN NW, MICHIGAN

3.75 MINUTE SERIES
SHEET NUMBER 52 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

43	44	45
52		54
61	62	63

43 SAINT HELEN SW
44 SAINT HELEN SE
45 OGEMAW SPRINGS SW
52 BUTMAN NW
54 EDWARDS NW
61 BUTMAN SW
62 BUTMAN SE
63 EDWARDS SW

INDEX TO ADJOINING 3.75 MAPS

BUTMAN NE, MICHIGAN

3.75 MINUTE SERIES
SHEET NUMBER 53 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
EDWARDS NW QUADRANGLE
SHEET NUMBER 54 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

44	45	A
53		B
62	63	C

44 SAINT HELEN SE
45 OGEMAW SPRINGS SW
A OGEMAW SPRINGS SE (OGEMAW COUNTY)
53 BUTMAN NE
B EDWARDS NE (OGEMAW COUNTY)
62 BUTMAN SE
63 EDWARDS SW
C EDWARDS SE (GLADWIN COUNTY)

INDEX TO ADJOINING 3.75 MAPS

EDWARDS NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 54 OF 63

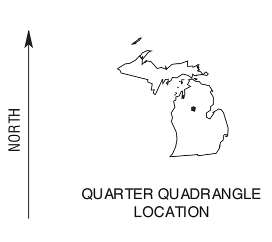
Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

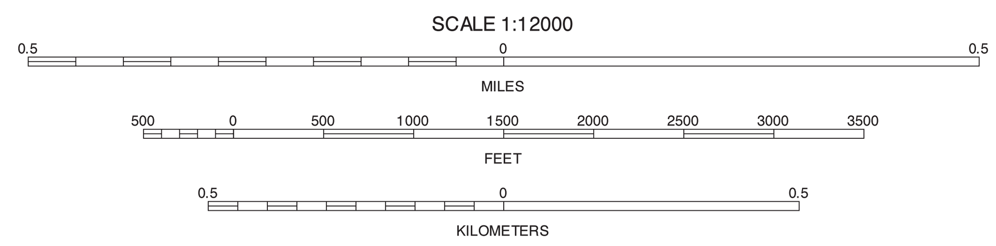
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
COOPERTON SW QUADRANGLE
SHEET NUMBER 55 OF 63

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service and co-operating agencies.Base maps are orthophotographs prepared by the U.S.Department of Interior, Geological Survey, from 1992 and 1998 aerial photography. The hydrography and cultural information were (was) acquired from the U.S. Geological Survey. The hydrography and cultural information were (was) edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.





A	46	47
B		56
C	D	E

A MODDERSVILLE NE (MISSAUKEE COUNTY)
46 COOPERTON NW
47 COOPERTON NE
B MODDERSVILLE SE (CLARE COUNTY)
56 COOPERTON SE
C PRESTLE CREEK NE (CLARE COUNTY)
D HARRISON NW (CLARE COUNTY)
E HARRISON NE (CLARE COUNTY)

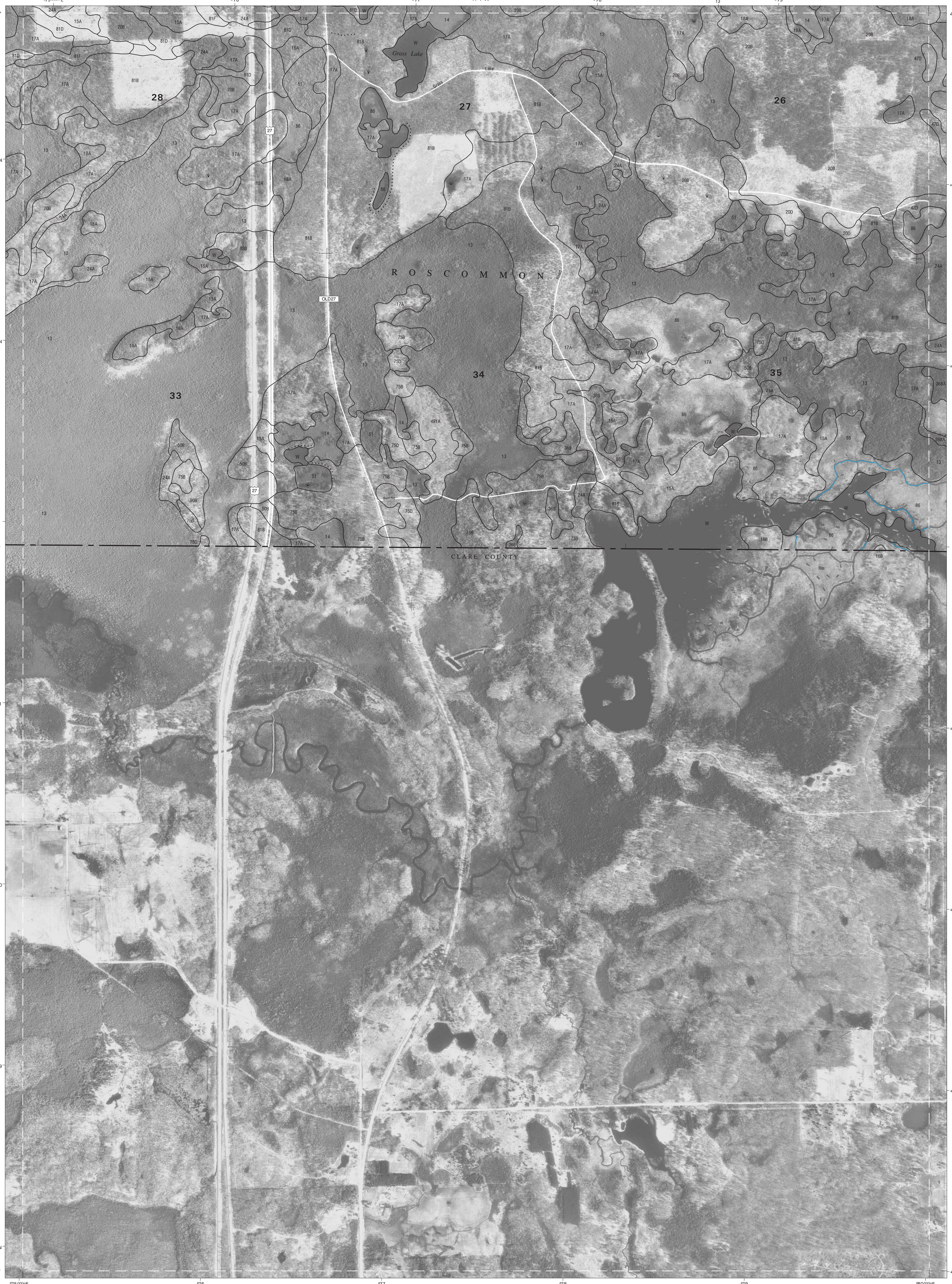
INDEX TO ADJOINING 3.75 MAPS

COOPERTON SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 55 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
COOPERTON SE QUADRANGLE
SHEET NUMBER 56 OF 63



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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

46	47	48
55		57
A	B	C

46 COOPERTON NW
47 COOPERTON NE
48 MEREDITH NW NW
55 COOPERTON SW
57 MEREDITH NW SW
A HARRISON NW (CLARE COUNTY)
B HARRISON NE (CLARE COUNTY)
C MEREDITH SW NW (CLARE COUNTY)

INDEX TO ADJOINING 3.75 MAPS

COOPERTON SE, MICHIGAN

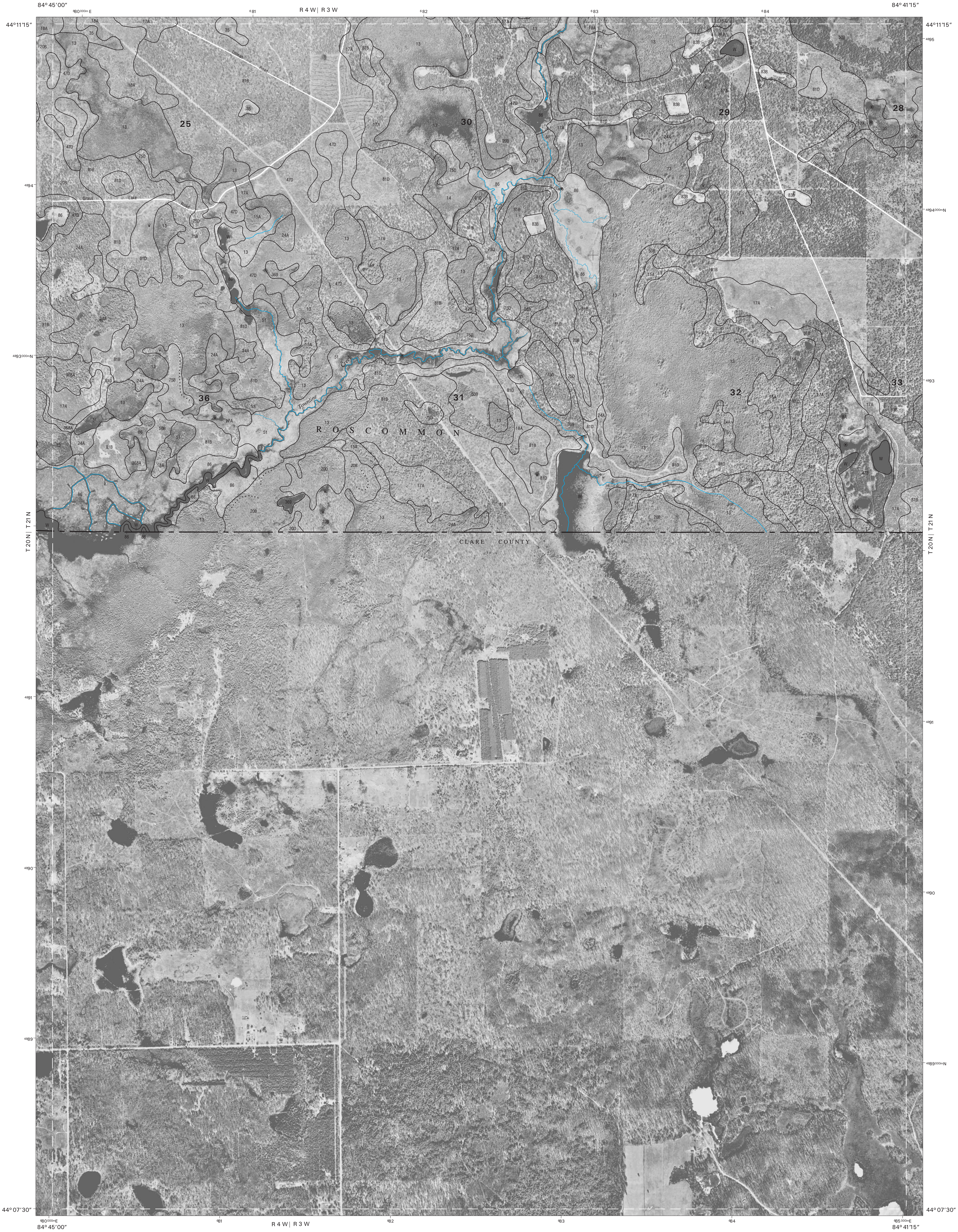
3.75 MINUTE SERIES

SHEET NUMBER 56 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
MEREDITH NW SW QUADRANGLE
SHEET NUMBER 57 OF 63



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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

47	48	49
56		58
A	B	C

47 COOOERTON NE
48 MEREDITH NW NW
49 MEREDITH NW NE
56 COOPERTON SE
58 MEREDITH NW SE
A HARRISON NE (CLARE COUNTY)
B MEREDITH SW NW (CLARE COUNTY)
C MEREDITH SW NE (CLARE COUNTY)

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MEREDITH NW SW, MICHIGAN

3.75 MINUTE SERIES
SHEET NUMBER 57 OF 63

Soil map delineations extending beyond the dashed white quadrangle neatline are for reference only and are included on adjacent map sheets.

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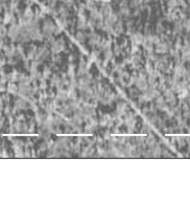
North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.



NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

48	49	50
57		59
A	B	C

48 MEREDITH NW NW
49 MEREDITH NW NE
50 MEREDITH NW
57 MEREDITH NW SW
59 MEREDITH SW
A MERIDITH SW NW (CLARE COUNTY)
B MERIDITH SW NE (CLARE COUNTY)
C SKEELS NW (GLADWIN COUNTY)

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MEREDITH NW SE, MICHIGAN
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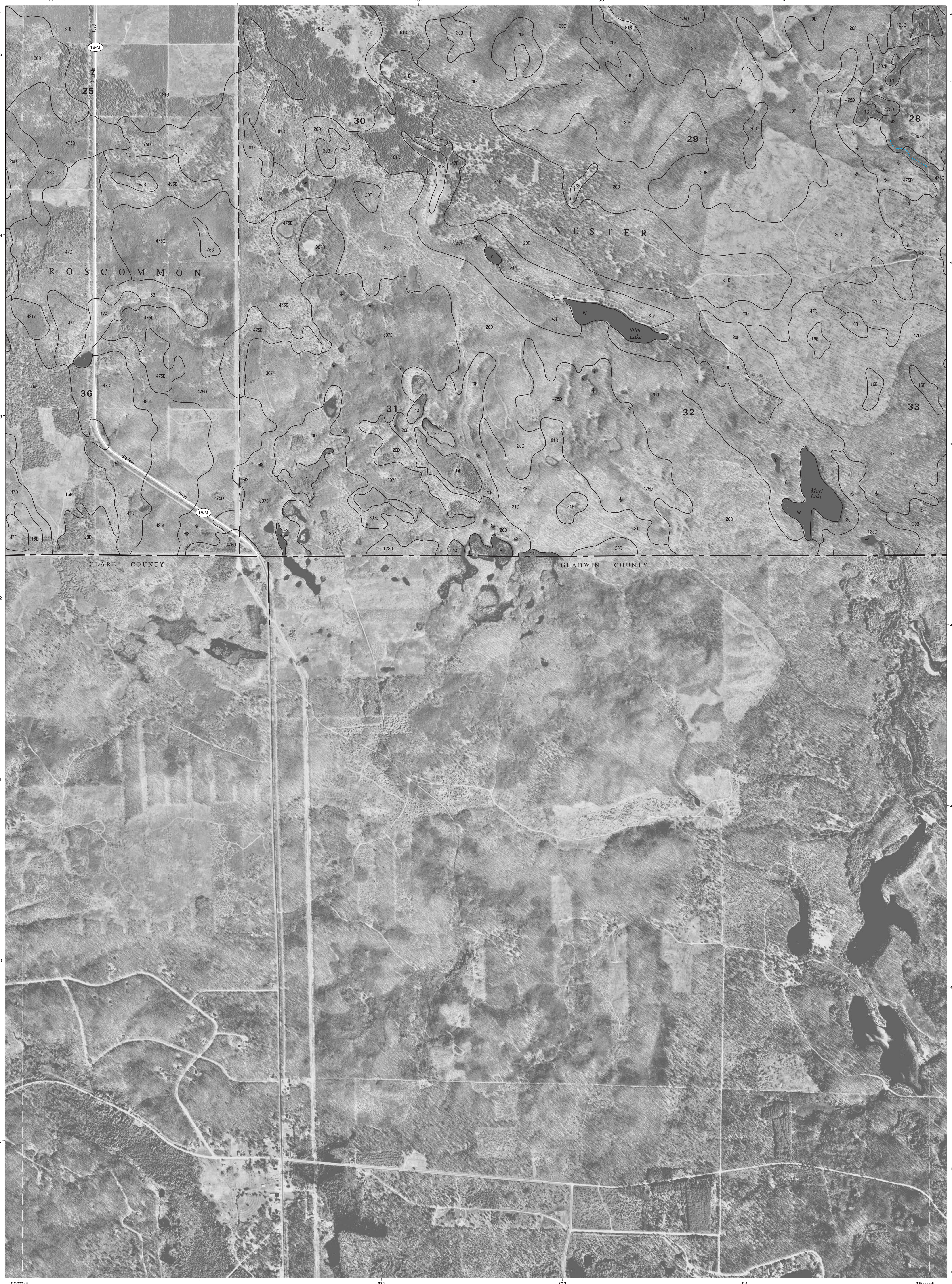
UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

ROSCOMMON COUNTY, MICHIGAN
MEREDITH SW QUADRANGLE
SHEET NUMBER 59 OF 63



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North American Datum of 1983 (NAD83). GRS-80 Spheriod 1000-meter ticks: Universal Transverse Mercator, zone 16. Coordinate grid ticks and land division data, if shown, are approximately positioned. Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

MILES

FEET

KILOMETERS

49	50	51
58		60
A	B	C

49 MEREDITH NW NE
50 MEREDITH NW
51 MEREDITH NE
58 MEREDITH NW SE
60 MEREDITH SE
A MEREDITH SW NE (CLARE COUNTY)
B SKEELS NW (GLADWIN COUNTY)
C SKEELS NE (GLADWIN COUNTY)

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UNITED STATES
DEPARTMENT OF AGRICULTURE
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ROSCOMMON COUNTY, MICHIGAN
MEREDITH SE QUADRANGLE
SHEET NUMBER 60 OF 63

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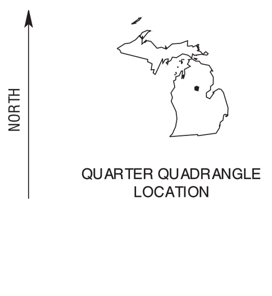
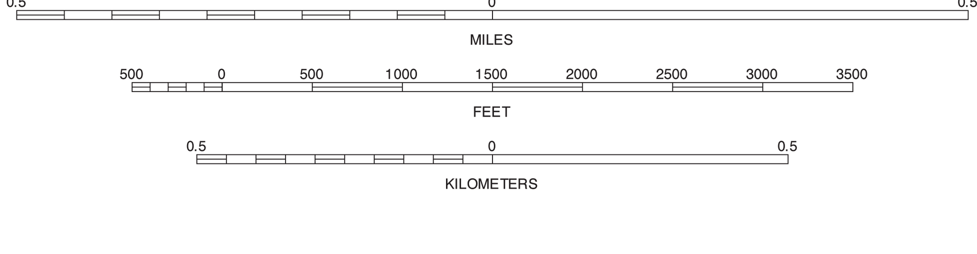


QUARTER QUADRANGLE LOCATION

SCALE 1:12000



50	51	52
59		61
A	B	C

50 MEREDITH NW
51 MEREDITH NE
52 BUTMAN NW
59 MEREDITH SW
61 BUTMAN SW
A SKEELS NW (GLADWIN COUNTY)
B SKEELS NE (GLADWIN COUNTY)
C WAGARVILLE NW (GLADWIN COUNTY)

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MEREDITH SE, MICHIGAN

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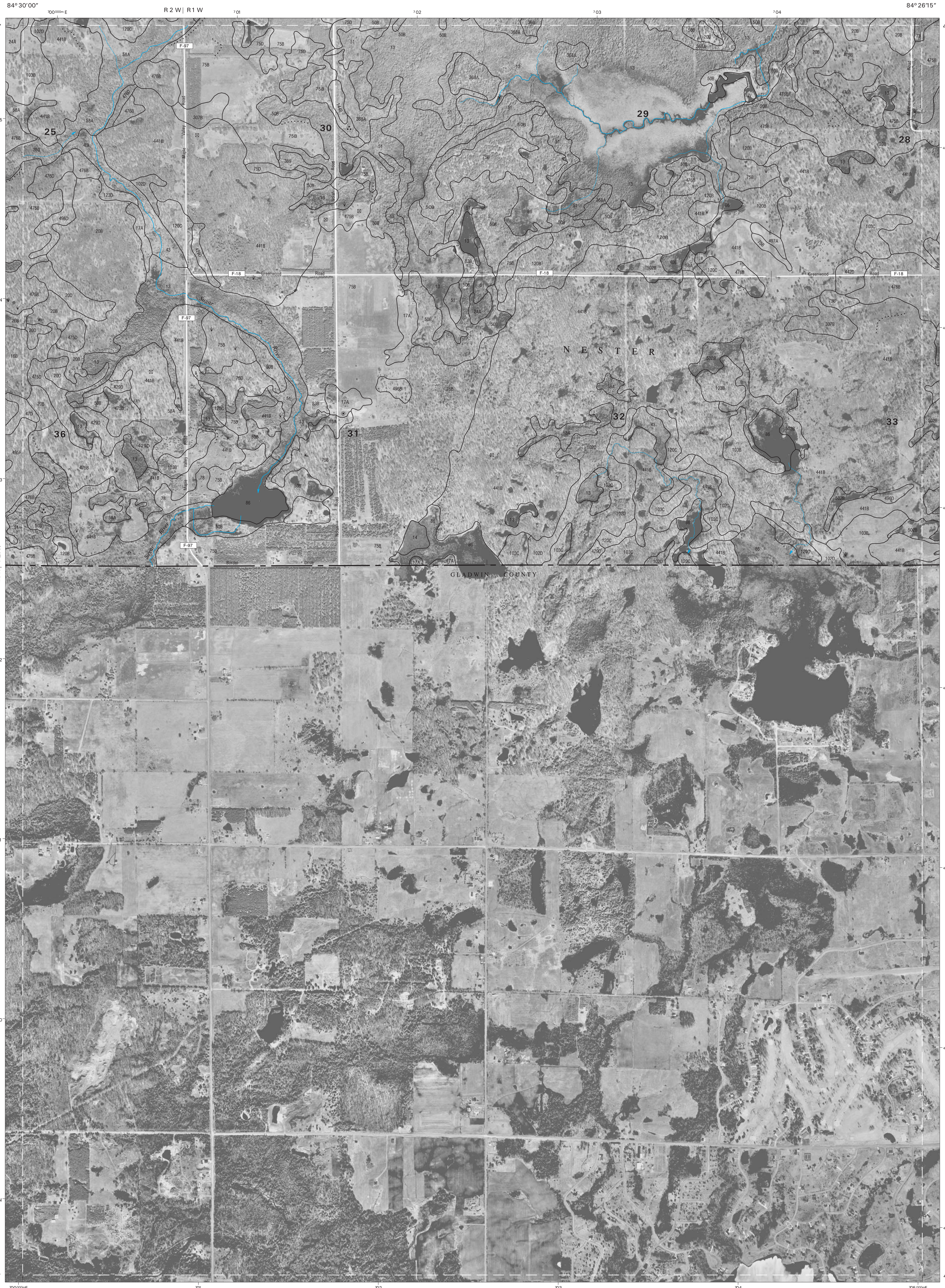
ROSCOMMON COUNTY, MICHIGAN
BUTMAN SW QUADRANGLE
SHEET NUMBER 61 OF 63



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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

51	52	53
60		62
A	B	C

51 MEREDITH NE
52 BUTMAN NW
53 BUTMAN NE
60 MEREDITH SE
62 BUTMAN SE
A WAGARVILLE NW (GLADWIN COUNTY)
B WAGARVILLE NE (GLADWIN COUNTY)
C SECORD LAKE NE (GLADWIN COUNTY)

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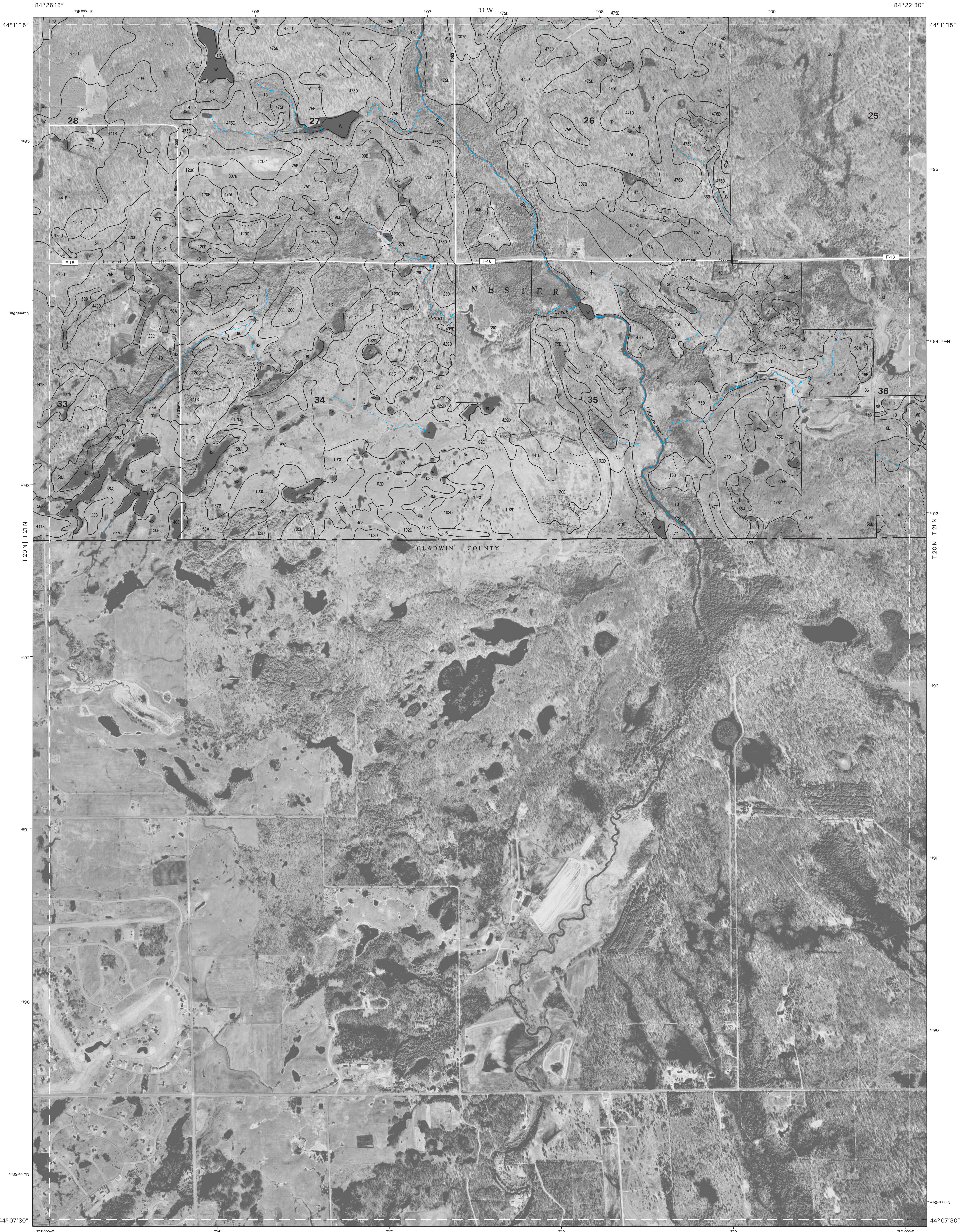
ROSCOMMON COUNTY, MICHIGAN
BUTMAN SE QUADRANGLE
SHEET NUMBER 62 OF 63



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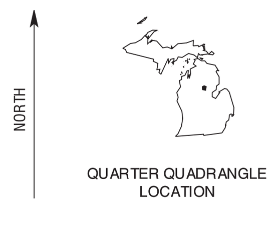
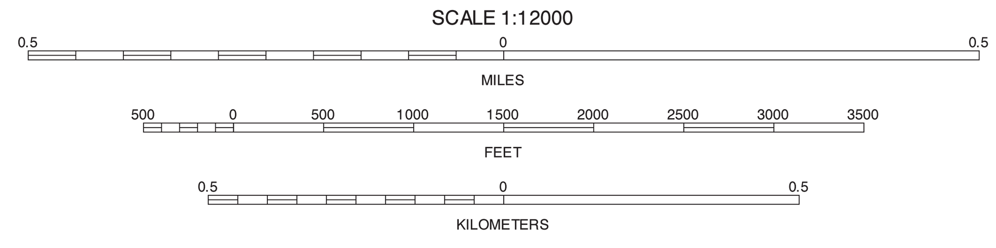


QUARTER QUADRANGLE LOCATION

SCALE 1:12000



52	53	54
61		63
A	B	C

52 BUTMAN NW
53 BUTMAN NE
54 EDWARDS NW
61 BUTMAN SW
63 EDWARDS SW
A WAGARVILLE NW (GLADWIN COUNTY)
B WAGARVILLE NE (GLADWIN COUNTY)
C SECORD LAKE NW (GLADWIN COUNTY)

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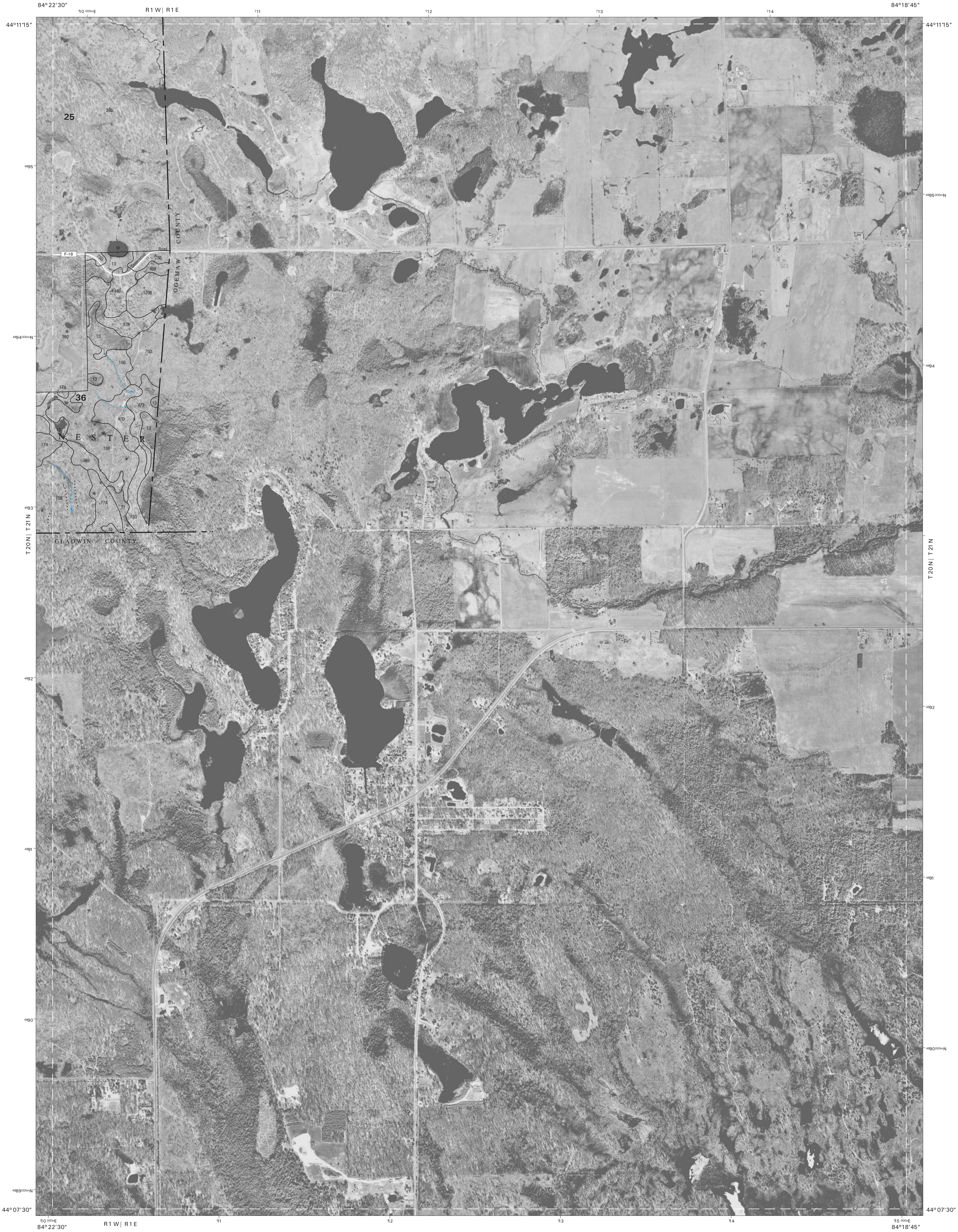
ROSCOMMON COUNTY, MICHIGAN
EDWARDS SW QUADRANGLE
SHEET NUMBER 63 OF 63



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NORTH

QUARTER QUADRANGLE LOCATION

SCALE 1:12000

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

53	54	A
62		B
C	D	E

53 BUTMAN NE
54 EDWARDS NW
A EDWARDS NE (OGEMAW COUNTY)
62 BUTMAN SE
B EDWARDS SE (OGEMAW COUNTY)
C WAGARVILLE NE (GLADWIN COUNTY)
D SECORD LAKE NW (GLADWIN COUNTY)
E SECORD LAKE NE (GLADWIN COUNTY)

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